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KURAM FIELD FORCE."

BY

G. A. OLIPHANT,

VETERINARY SURGEON (1st CLASS.)

OFFICIATING INSPECTING VETERINARY SURGEON,
"KURAM FIELD FORCE."



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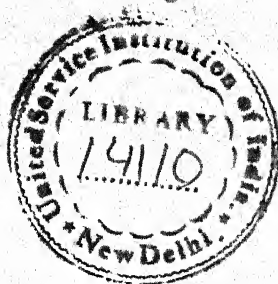
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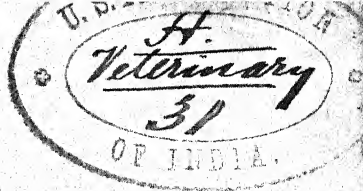
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CAMPAIGNS.

[Through the kindness of G. A. Oliphant, 1st Class Veterinary Surgeon (at present officiating P. V. S. in India) we are enabled to give the substance of his "REPORT UPON THE WORKING OF THE VETERINARY DEPARTMENT OF THE KURAM FIELD FORCE"—dated Hapur, North-Western Provinces, the 26th December 1880. This Report is considered by the Commander-in-Chief "valuable, interesting, and well worthy of being printed." By the then P. V. S. in India it is stated that "Mr. Oliphant has entered fully and yet concisely, into every departmental point bearing upon the various classes of animals under his administrative care, and the amount of practical information recorded in the Report will prove of the greatest importance in the training of the Junior Members of the Department at the Veterinary School at Aldershot, and enable them to realize the departmental requirements of India before taking their tour of service."]

Mr. Oliphant's tour of service as Inspecting Veterinary Surgeon of the Kuram Field Force occupied from 11th Oct. 1879 to 20th Oct. 1880, and extended over the line of country from Kohat to Ali Khel (146 miles) which he thus describes in detail from a veterinary point of view.

Kohat, a Civil and Military frontier station, is situated close to the entrance of the Kohat Pass, 40 miles South West of Peshawar. It stands on slightly elevated ground, about 3 miles from the Hills; but the country immediately surrounding is fairly level, and watered by numerous brooks, serving for purposes of irrigation, for the cultivated land. Several of these run through the station and are usually in a very unsanitary state, the bottom naturally gravelly, being coated with muddy slime and decomposing vegetable and other matters. The smell from them, especially in the hot season, is often particularly offensive, and, in connection with marsh miasma arising from the surrounding irrigated fields, tends, I doubt not, to the production of fever, and probably cholera, both of which diseases are not uncommon. The supply of water for the troops is brought from the neighbourhood of the hills in a closed duct, and delivered in covered tanks, from which

it is drawn off by taps, as required. The supply for animal use is, of course, from the brooks, and must vary in quality according to the particular place resorted to, and the degree of pollution from neighbouring causes. The soil of the higher parts is rock and gravel, largely interspersed with boulders; that of the bottoms an alluvial loam. E. Battery, 3rd Brigade, Royal Artillery, with exception of one division at Thal, for a portion of the period was stationed here, and the horses retained fair condition throughout, although grass was difficult to obtain during the cold and hot months, a difficulty often increased by the prostration of the grass-cutters by fever. The complement was, however, made up by the Commissariat supply of dry grass, *Kurbi* or Indian-corn stalks, &c. The grain (barley) was, on my first inspection, being given whole, or indifferently crushed in hand-mills; but was afterwards sent to the water-mills, of which there are many in the neighbourhood, and more thoroughly broken, with great benefit to the horses. The horse lines were on high ground, but much closed in on three sides by buildings; and a latrine, used by the patients in the native hospital, in close proximity to the stables and forge, did not, I fear, add to the salubrity of the place.

The stables were very poor, originally built for the mules of a mountain battery,—little better than sheds, with flat or nearly flat roofs offering no protection, except from the actual vertical rays of the sun. The ground formed a bad floor, as it was difficult to keep a level surface, owing to the constant working up of the stones, and urine was readily absorbed. Digging up the stalls and re-making the floor was a very laborious matter. The watering place was a gravel-bottomed brook with a running stream of apparently pure water; but in its course it was used for irrigation purposes, resorted to by *dhobies*, &c. There were two distinct cases of *anthrax fever* during my periodical visits to the station in horses of the battery, both of which recovered under treatment with carbolic acid, and one death was reported to me in the month of August, which was supposed by the officer commanding to have arisen from the disease. No Veterinary Surgeon was available for regular duty; but from the end of December to the end of July aid was given by the officer in charge of the transport hospital, and, for a portion of the time, by myself.

There are permanent Native Cavalry lines, fairly extensive, but owing to the necessity for protection from Afridi marauders, closely walled in, and the stables, barracks, &c., much crowded together. They belong to the Frontier Force, but were occupied at different times by the 18th Bengal Cavalry and 1st Bengal Cavalry serving with the Kuram Force, as well as by sundry animals of various regiments from the Khyber and Kabul lines.

The sanitary state was not generally good. Having been occupied by various troops for short periods at intervals, manure had been allowed to collect, and the standings were neglected. There was no special sickness amongst the horses, but considerable difficulty experienced with regard to the grass supply, owing to scarcity of grass itself, sickness of grass-cutters, and excessive dearness of fodder in the market,—dry grass, Indian corn stalks (*kurbi*), and *bhoosa* selling for 20 seers per rupee, and even less. The price of grain too was excessively high, being Rs. 6 to Rs. 8 per maund. A large hospital for the transport was established in December 1879, to relieve the line of the enormous number of sick animals of all classes then present, and was continued working satisfactorily till the middle of May 1880, when, owing to the greatly reduced number, and the inconvenience of having it so far to the rear in the hot weather, it was abolished, and the remaining patients transferred to Thal and Kuram. The temperature of Kohat during the winter months is decidedly low, the nights being especially cold. May, June, July, and August are very hot, and there appears to be no regular rain-fall; but frequent thunder-storms occur, and these lower the temperature often from 96° in the shade to 85°.

From Kohat to Thal, a distance of 62 miles, in a south-westerly direction, by a good road traversed by mail carts, through the lower and upper Miranzai Valleys. These two valleys, divided by the water shed about midway, are bounded on either side by lofty mountains, with ranges of lower hills running down to the rivers, fed by streams from the higher ground, and numerous springs. There is cultivation surrounding the villages in the neighbourhood of the streams, with extensive browsing on the wild olive, etc., for camels. From the spring till the cold weather sets in there is a very ample crop of good *dry* grass. There are

many points between Thal and Kohat where cavalry can be encamped with advantage; and the greatest benefit was derived in this way by the horses of the 1st Bengal Cavalry. The regiment left Thal after having lost a very large number of horses, in, as far as animals went, an unserviceable state, but, after a few months' residence at Togh and Hangh, they were quite restored. There are on the road six main outposts occupied by the Cavalry detachments, having accommodation for travellers and animals—night travelling not being permitted on account of the danger from marauders from the various tribes in the neighbourhood. The *serais* are walled-in enclosures, and, on account of the necessarily limited accommodation, and the number of animals of different classes placed in them, while there was little or no European supervision, they were not kept in the best sanitary condition. There was, however, no particular outbreak of sickness on this part of the road, and only one case of glanders amongst the Cavalry horses. From the last post on the road "*Gundior*," the ground rises rapidly to the plateau of Thal; the camp being situated on it, opposite the mouth of the Kuram Valley, the transport lines on lower ground, shut in on either side by barren volcanic-looking hills, with no vegetation in the neighbourhood beyond a few stunted thorny bushes. Water in immediate proximity to the camp, scarce and bad. Soil, on the high parts, gravel and boulders on a subsoil of rock, the portion below the plateau merely the dry bed of a mountain stream. Every square foot of the camp, necessarily contracted for defensive purposes, occupied for the past two years by man and animals. The surrounding nullahs foul from use as latrines by natives, beaten on by a fierce sun for six months out of the year, and receiving only rain-fall sufficient to wash the filth into the already saturated surface soil. It has proved a pest house to both man and beast.

Scarcely one officer or soldier, European or Native, escaped from fever of a severe type, often accompanied by bilious vomiting and purging, and the horses have suffered from *anthrax fever* and *glanders*, while *rinderpest* has appeared on several occasions and only been arrested by the greatest watchfulness and care. Lately the disease of *surra* has affected the horses of the 18th Bengal Cavalry, causing enormous loss. In the immediate neighbourhood here is no fodder, and in the cold season, when grass was scarce

even in the Miranzai Valley, the Cavalry grass-cutters had to go 12 miles, and return the same distance, leaving camp before dawn and returning after dark. In consequence, grass of any description obtainable was brought in, often only rushes and reeds from the swamps in the neighbour-hood of the rivers. Dry hill grass, smelling strongly of turpentine, *bhusa*, and *kurbi* were brought in for sale, and obtained by the commissariat, transport, etc., at fabulous rates.

From *Thal* the road leads in a north-easterly direction up the bed of the Kuram river, or along the base of the hills crossing a high pass or *Kotal* excessively trying to transport animals, especially camels (ultimately a road was made round the hill), through a barren hilly country, producing at most a few thorny bushes and dwarf palms, to Chapri, 9 miles distant, a small fort and cattle enclosure, situated immediately above the bed of the river, occupied by a detachment of Cavalry and some infantry, and used as the first halting place. On my first visiting this post in October 1879, it was in a particularly unsanitary condition, and *anthrax fever* was rife in it amongst the Cavalry horses and post office ponies. Throughout the campaign this post remained the least clean of all, probably from its unhealthy, feverish climate. The men employed to keep it clean, and those whose duty it was to supervise them, were too often too ill to do their duty, or too languid from the effects of fever to attend to it. Water at this place was obtained from the Kuram river, and depended as to quality much on state of the stream, as affected by rain or snow-fall in the hills. Grass there was none, and any fodder for use had to be carried on pack animals from below *Thal*. Later on, when a post was established on the opposite side of this river, the grass-cutters could cross and obtain a certain amount of green grass. Although latterly there were fewer deaths at Chapri, it returned a considerable percentage of sick animals to head-quarters.

From *Chapri* to *Manduri*, a short march of 4 miles, the valley very contracted, the hills coming down to the river on either side, Vegetation consisting of tufts of coarse grass and dwarf palms, growing between huge boulders of conglomerate rock and masses of sand-stone blackened to the colour of coal by the weather. Crossing a small *kotal* the road dips down to the fort of *Manduri*, and the river here taking a sweep outwards,

to pass the end of the hill over which the road crosses and which juts out from the main range at right angles, and the valley contracting again, immediately beyond, gives the place, surrounded as it is by bare rocks, the appearance almost of the crater of a volcano. It would require no great sketch of imagination to fancy it "Aden," except that no sea breeze tempers the heat. The fort, fairly commodious, had a large cattle enclosure attached. The cavalry horses were picketed in the former, the latter was occupied by transport animals. Grass was obtained from the opposite bank of the river by grass-cutters, under the protection of a guard, but at times it was scarce and bad. Manduri, too, furnished a very large porportion of casualties, more especially before proper sanitary arrangements were carried out in the horse lines, and I am glad to say that very much was attained in this way by the co-operation of the European officers ultimately placed in charge. Water was obtained from the river, but the stream being somewhat distant, and there being other intervening sluggish streams and pools, there was some degree of temptation to the sowars and syces to save trouble by watering the horses at the nearer, and not the purer supply.

Manduri to Alizai, 7 miles, the road through an alluvial bottom of cultivated, irrigated land, on which large rice crops are grown, the malaria from the swampy ground drying up under an August sun, very productive of febrile diseases, and the streams of water, filtering through the fields, by no means fit for drinking purposes. The fort of Alizai, a small one, situated nearly a mile from the river, and backed up by barren hills. All animals, both cavalry and transport, were picketed in a cattle enclosure attached, and sick animals detained from convoys were generally kept in a thorn enclosure outside. *Shinak*, the next post, distant 6 miles, reached by a road through an uncultivated tract of country, rising gradually till the last mile, and then rapidly to a high plateau on which the fort stands. The Cavalry horses were kept inside, and occupied the same spot for many months, and the lines were not always perfectly clean. Cases of *surra* existed here on my last inspection. Other animals were kept in an adjacent enclosure. The river is about three quarters of a mile distant, probably 200 feet below the level of the fort, and the horses were said to be watered at it; but, as there is an interven-

ing mill-stream at the foot of the hill, it is more than likely that this was used, and the water was not so pure. *From the last named place to Balesh Khel*, 8 miles, the road through more or less cultivated country. The fort of Balesh Khel is situated immediately above the river, and surrounded by much low-lying cultivated land, the ground between it and the hills covered with low jungle and intersected by ravines. The fort had originally been occupied by a native contingent, and the soil was much fouled. It was occupied by a regiment of Native Infantry and their transport animals; and, originally, also, the Cavalry horses were picketed in it, but were afterwards accommodated with lines outside. I had on several occasions to report on the unsanitary state of the horse standings, as indeed I had to do with regard to all the forts, but latterly there was much improvement. Water was obtainable either from the river or from springs and irrigation channels. This was an excessively "feverish" post, and in August and September last the 18th Bengal Cavalry horses suffered from *Surra*. The general transport *Serai* was situated about a mile off and was fairly commodious and clean.

Walli Mahomed Kila, 9 miles, road running along the base of low stony hills, sparsely covered with stunted brush wood, and extending close down to the river. The "post" itself was an old native fort, close, hot, and ill-ventilated, standing immediately above the bed of the river, with some rice and other cultivation in its neighbourhood. The cavalry horses were kept in court yards with high walls, the transport animals outside. Water obtained from the river. No particular form of disease prevailed.

Hence to Kuram, the road, with a considerable amount of cultivation near the river, rises considerably, and about half-way, the whole distance being 9 miles, the country opens out almost suddenly, into a wide valley, 8 miles across, having a gentle slope from the range of the "Safed Koh" to the Kuram river, bounded on the further bank by the hills of the Khost country. This wide portion,—the upper Kuram valley proper,—is stony and rough, but the soil being alluvial, is, wherever irrigation is available, extremely rich; and the villages immediately under the Safed Koh, of which Shalozan, near which a site was chosen for a permanent cantonment, is one, built where streams issue

from the mountains, in the mouths of passes, are surrounded by extremely fertile fields: while fruit trees,—walnuts, apples, pears, peaches, plums, etc., are remarkably fine. In the warm weather, and when there is rain, *dûp* and other short grasses are plentiful, and the ground is besprinkled with common English herbs as thyme, mint, sage, pennyroyal, and many others, as well as a large number of well-known English plants. Kuram, 4,750 feet, is in the immediate vicinity of the river and is damp, water being very close to the surface. The slope is, however, sufficient to insure drainage; and although the place is somewhat feverish, it did not enjoy a particularly unenviable notoriety in that respect. Animals, except camels, were healthy in the summer months, and improved rapidly in condition on the excellent *dûp* grass and other green fodder obtainable; but in the winter they suffered much, and died from cold and exposure. Kuram was simply a camp, latterly enclosed by walls, the two native forts being used for stores, and un-occupied by animals. A large transport depot was always kept here, and in the hot months the principal part of the hospital was removed from Kohat and Thal. Water was abundant and good, but was, I fear, contaminated in places by the construction of latrines and grave-yards above the spring level. Water also reached the camp by streams from the Hills, but was generally discoloured and impure, and also liable to be cut off at any time for purposes of irrigation at a higher level.

Shalozan, 9 miles, from Kuram, and 6,000 feet high, 6 or 7 miles distant from the river, and only about 2 miles from the foot of the hills. Features of the country and soil, as already described; an open camp. In the warm moist weather, grass plentiful; water supply bad, running in open channels, and only reaching the camp after passing through villages, irrigating fields, etc., often turbid, and much discolored after rain. I believe diarrhoea was not uncommon in the human subject, but no particular disease amongst animals, always excepting camels. A few cases of *anthrax* occurred amongst horses, etc., as at other stations on the line. *Peiwar Kotal*, a pass over a spur of the "Safed Koh," extending from the highest Mountain (Sikha Ram, 15,620 feet), at right angles to the main range, to the Kuram river, terminating the

Kuram Valley, and dividing it from the Hariab Valley, distance 11 miles. The road first traversing the plain for several miles, rising probably to the height of 7,000 feet, passes through a country broken into ravines covered with dense wood of the *Ilex* or dwarf oak, winds up by zig-zags to a height of 8,800 feet, the hills jutting above the pass reaching 9,200. The rock lime-stone, covered with a layer of vegetable mould, and studded with noble *Deodars*, gives exit to several good springs of somewhat hard but pure water, and the air, though rarified, is fine in the extreme. But, when clouds come over, and rain and hail falls, which happens even up to the end of May, the change of temperature is trying to the most robust; and the steep ascent, road slippery from wet, and sudden fall of temperature, was very often fatal to the camels as they wended their upward way with commissariat stores. Mules, ponies, etc., did well on the *kotal* during the summer months, though fodder was scarce, most being brought from the valleys on either side. The mules of the mountain battery going up in the early part of the year fell off in condition, but soon regained it again. The *khika* grass, said to be poisonous to animals, grows commonly under the trees, and I obtained specimens of it. I will treat of it more in detail hereafter. *From the Kotal the road descends* by a long gentle slope to the Hariab Valley, and continues to Ali Khel, distant 13 miles, and 6,000 feet high. The valley is narrow, well cultivated, bounded on either hand by lofty mountain ranges, in many parts well clothed with trees. The Camp at Ali Khel was situated on a plateau, or rather, at the time I was there, in October 1879, on the side of a hill overlooking the plateau, having been constructed for defensive purposes. Barren, dusty, hot by day and with 70 degrees of frost at night, it was not a pleasant residence, and the animals there generally were in poor condition from exposure, work, rough fodder, etc., nothing but Indian Corn stalks and dry grass being obtainable. Water was plentiful below the camp, the three rivers—Hariab, Kuram, and Shutargardan—uniting there, but the banks of these streams were contaminated by the bodies of dead animals. Water was also brought on to the plateau by a duct, but it was turbid and liable to be cut off by the villagers.

Climate.—The winter in the Hariab, and on the Peiwar Kotal

more especially, is of course severe, snow lying for many weeks, and this extends in a modified degree down to Shalozan, where, I believe, it remained for several weeks last winter. At Kuram there was but one or two day's snow; but the place is unpleasantly noted for a biting cold wind, blowing off the hills of the Safed Koh, and this commences early in November, and lasts until the spring, combined with frost, etc., it proved fatal in 48 hours in the beginning of February to 60 animals of the transport, an elephant, and a number of commissariat cattle and sheep. Considerable degree of cold is felt as low down as Balesh Khel, where, in one night in December, 40 camels succumbed to it. Below that point the temperature is, I think, but little lower than in the Punjab at the same time of year, though, as low as Alizai light falls of snow have occurred.

The summer season of the Peiwar Kotal and Hariab is temperate, varying, of course, with the elevation; and that of Shalozan and Kuram is but little hotter than extreme summer weather in England. Balesh Khel to Thal is extremely hot, the effects being rendered more severe by the contracted nature of the valley, its sterility and the reflection of the sun from the rocks. It can hardly be said that there is any real wet season,—nothing resembling the monsoon—but there are frequent thunder-storms in July and August, keeping, however, very much to the line of the hills, but occasionally sweeping down, or across the valley with tremendous force. Thal is subject to storms of cyclonic character, and one of the kind occurring on the 26th of June levelled every tent in the camp, and left hardly a hut uninjured. The hot season of Thal is very severe. The climate below Thal, of the Upper and Lower Miranzai Valleys is pleasant in the winter, cold at night and in parts subject to sudden rushes of cold wind from the hills. In the summer, as far as my experience went in marching through it in June and July, not unpleasantly hot.

Fodder products, grain, etc.: As far as I could judge, the whole length of the line I have spoken of produces two crops per year. Barley, wheat, etc., sown in the autumn, are reaped in May and June, and crops of rice are then quickly transplanted from the seed beds, as is the case in India, the plants being dibbled in by hand into the swamped fields. Indian corn, Millet, moong, mote, etc.

are also sown; these ripen about the middle of October. The extent of cultivation is not great, being limited to the immediate neighbourhood of the villages which are all built with a view to obtaining irrigation; and no very great amount of grain comes into the market, although, I doubt not that continued demand would increase the supply, as the people are no mean cultivators, and the labour expended on the formation of irrigation channels, bringing water from higher levels at long distances, is considerable. The barley is of good quality, and the Indian corn also, though not "weighty." The people themselves eat the maize-meal largely, probably mixed with wheaten flour, made into fermented bread of a very superior description to anything of the kind obtainable in the plains of India. Both these grains require grinding thoroughly before being given to animals to obtain their full nutritive value. Rice is obtainable in its unhusked state as *dhan*, but as an animal food it is but of little value. The hard husk and beard is very apt to produce most troublesome and often fatal diarrhoea and dysentery in bullocks, this, probably, being more the case when it is new, while its nutritious properties are low, excepting starch, and an animal cannot, therefore, exist for long on it, especially when supplied with dry fodder. I go a little fully into the question here, as it is one that has been discussed to some slight extent in the Kuram Force, and it was argued that ponies in Burmah lived constantly on it, and thrive well, while the Afghans also fed their animals on it. It must be borne in mind that Burmah is rich in good green *dup* grass, on which a hardy animal like the pony of the country would fatten alone. I made diligent enquiries among the various classes of mule, etc, drivers, aided by an interpreter, and the almost universal answer to my question as to what they fed their pack animals on was,—whatever we can spare from our own bellies. To the further interrogatory as to whether they consider *dhan* a valuable article of food, the reply was constantly in the negative, qualified only by the statement that it was better than nothing. Strangely enough they spoke highly of wheat, a grain we have been wont to consider injurious, as far, at least, as it applies to the horse. The other grains are not worth taking into consideration here, being, only used for human food, except *mote*, a valuable animal food

which was used in considerable quantities by the 1st Bengal Cavalry below Thal with great benefit to their debilitated horses; but the stalks or straw of all are valuable as fodder, and formed the mainstay, in this respect, of animals of the transport. *Kurbi*, the stalk of the Indian corn, was largely used, and is good rough fodder for mules, ponies, etc; the fresher and greener the better.

Rice-straw, a tough flexible straw, not a good fodder,—very apt to be mouldy, difficult to masticate, and very indigestible. Two kinds were obtainable, coarse and fine, the latter the more edible. Barley and Wheat *bhusa*, the finely broken straw, resulting from the process of treading out the grain by oxen, and freed from the grain by winnowing. This fodder, used in India only for working bullocks, has a bad name as far as feeding horses on it goes, and I certainly have seen numerous cases of obstruction of the bowels amongst natives' horses from its use. So strongly was this idea entertained in the Stud Department, that the oat straw in common use was always chopped up into chaff, as it was supposed to be less likely to accumulate in the intestines. However, I saw no case of sickness from this cause in Afghanistan, and camels, mules, ponies, and bullocks were freely fed on it. Other descriptions of *bhusa*, made in the same way from *mote*, *moong*, *ooreed*, &c., trailing large leaved plants, and known as the green variety, in contradistinction to the name *white bhusa* as applied to that already mentioned, were also obtainable, but in limited quantities. These are valuable articles of food, well known as such in India, and far superior, in the case of camels to other kinds.

The value of these fodders in the plains is usually two to four annas per maund. In the Kuram Valley, and as low down as Kohat the price was represented by about the same number of rupees, and occasionally even very much more. Dry grass of several varieties was brought in for sale from the hills. The two principal descriptions were a long white grass, with a reddish brown blossom, called *Sûr Gul*, and a smaller coarse variety of a red colour, known locally as *Sirgurree*. When fresh the *Sûr Gul* has much the smell of "lemon" grass, and when rubbed in the hand, exudes an essential oil. The latter description has an excessively strong odour of turpentine. The scent in both cases decreased as the grass dried; but except the mule and donkey no

animal ate them freely, and even these two would not do so unless hungry. The price of the grass also ruled high, 20 seers per rupee being often obtainable. Green clover, green wheat or barley, Indian corn, and rice were also obtainable in their respective seasons, and were very valuable additions to the feed of the transport and other animals. The shorter descriptions of grass as *dup*, etc., were not obtainable in the market, as the "Pathan" does not use the Koorpee, but only the reaping hook, and can therefore collect only long grasses which admit of being cut with that instrument. The trailing varieties are only obtainable by the process of paring the surface of the ground, or digging them up with the instrument commonly used by the Indian grass-cutter. In the latter part of the summer, however, considerable quantities of *dup* grass were obtained at Shalozan, Kuram, and other parts of the line by *kahars*, and at Thal it was brought in from the Miranzai Valley in large quantities by the Artillery and Cavalry grass-cutters, much to the improvement in condition of the horses.

One article of food was used in the beginning of the Campaign as a matter of economy, but, as might have been expected, with anything but favourable result on the condition of the transport animals. I allude to condemned flour. I have already reported on the subject, and need not dwell on it further. It will be evident that wheaten flour which had become mouldy from damp would not be likely to prove wholesome food, even if consumed; but as, owing to its smell, animals would rarely eat it, semi-starvation was the principal result of the experiment.

Water.—The supply from the Kuram river, where available from proximity, resulting from the snow and rain-fall in the hills principally, was moderately soft, and when clear, good; but it was liable to become turbid, and contained a large amount of suspended earthy matter after heavy rain. The stony bed of the river, being of much greater width than the stream, except when running under high cliffs, the villages were, as a rule, situated considerable distances from the water, and it was, therefore, generally free from contamination in this respect. In the neighbourhood of Kuram, especially, I fear we added a quota of organic matter to the water by the burial of many hundred dead animals on the

banks of streams running down into the river. The natives object to drink the river water during the melting of the snow, but prefer it to spring water at other times. As before mentioned when treating of Kuram and Shalozan, the side streams running down into the main river must depend a great deal for their purity or impurity on their immediate surroundings.

Having thus alluded to the physical characteristics of the country, as far as I am able with its productions of animal food, climate, &c., I will sketch slightly *the tours made by me* during the thirteen months of my residence. On receiving my orders to proceed to the Kuram from Calcutta, I started, after one day's delay to outfit, and proceeded, with a stoppage only of 24 hours, to Rawal Pindi, but here, and again at Kohat, carriage was only available after nearly a week's delay at either place. I however took the opportunity at Kohat of making myself acquainted with the working of the transport system there, aided in my enquiries in every way by the officer in charge, Major Baines of the 6th Regiment. There were a considerable number of mules and ponies laid up, unfitted for work from sore-backs, want of condition, &c., and a very large number of hired bullocks. The inspection was fully reported on at the time, *vide* No. 5 dated 9th October 1879; but I may allude, in passing, to the evident want of organization, whereby hired animals were sent up by hundreds with no arrangements for the supply of food, that being left entirely to the owner who, from the excessively high rates of grain and fodder, was perhaps unable to keep his animals in good condition with fair margin of profit to himself, and who probably speculated on being allowed to lay by at the base with his unserviceable animals, and ultimately if they died, get compensation.

I arrived at Thal on the 10th October, and made a partial inspection of the camp there,—reported in my No. 9, dated 23rd October,—but, owing to telegraphic orders received from the Brigade-Major, I left for Ali Khel on the 14th, arriving on the 21st. I regretted this move, as I wished to make some efficient hospital arrangement in the transport depot at Thal, which was in a state of utter confusion. It was impossible to make a proper inspection of the animals, which were in most instances not even arranged in lines; but I did my best to see that they were free

from at least infectious diseases. There were but few animals even in fair condition, and sore-backs were to be counted by hundreds, the sores being smeared over with mud, cow-dung, etc. The Government animals were getting rations of grain and fodder, but entirely under native supervision, and the hired animals were at the mercy of their owners. Arrangements for the repair or manufacture of pack gear there appeared to be none.

The various posts on the line, already named, in charge of native officers and non-commissioned officers, from Thal to Balesh Khel, I found in a most unsanitary condition, the horses of the 1st Bengal Cavalry and the postal ponies dying of *anthrax fever*, while cattle with foot and mouth disease were being returned in considerable numbers from the "front."

At Ali Khel I inspected the 9th Lancers, half battery C.-4th Royal Artillery, 1-8th Royal Artillery, Mountain Battery, detachments of the 5th Punjab Cavalry and 12th Punjab Cavalry, mules of the 4th Punjab Infantry, and the whole of the transport and commissariat animals. A full report of this inspection was made in No. 19 dated 12th November 1879. *Foot and mouth disease* was very rife amongst the slaughter cattle of the Commissariat, there being 140 cases out of 347 animals, and nothing whatever was being done to prevent its spread, in fact debilitated animals affected with the disease, were being sold by public auction to the natives of the surrounding villages. I represented the impropriety of this proceeding and the danger of spreading the disease by infection, and also caused the sick to be separated from the healthy. Many had ultimately to be slaughtered owing to their being too debilitated to march when the troops retired on Kuram shortly after. No. 1 Battery 8th Brigade marching in, there were two cases of supposed *strangles*, which on examination turned out to be *acute glanders*. Both were destroyed, but as they had been affected for some time on the march, I need hardly say that they left traces of the disease behind them, and I afterwards caused animals to be destroyed for it along the line to Kohat. The transport animals were in poor condition, suffering from sore-backs, *mange*, etc., and there were but few means of treatment. One or two men, calling themselves *salutries*, and getting good pay, but without the least qualification, were in charge. Feeding however was paid more attention to under the personal supervision of the transport officer

in charge. Hired animals were also being supplied with grain from the commissariat on payment by the owners, the amount being deducted from the hire. A transport hospital was established, and 1st Class Veterinary Surgeon Anderson placed in charge, and indents forwarded for a supply of medicines, instruments, &c.

I returned to Kuram about the 1st November, and commenced the inspection of the animals at that place, going very carefully through them, with a view to reporting on the probable number likely to be fit for work with the proposed expedition into the "Zaimukht" country. The results of this inspection were reported in No. 50, dated Thal, December 1879. These results were considerably in favour of hired animals, the owners, on being supplied with grain, fodder, &c., making some efforts to keep their animals alive, while the Government servant, without proper supervision, simply allowed the animals to die of starvation; in all probability, selling the grain. Cold, too, played a most important part in the heavy mortality which daily took place, the clothing being of the most wretched description, and shelter there being none from the bitterly cold wind blowing off the snow-covered hills. The drivers and owners of animals, often with nothing but miserable cotton clothes to cover them, undoubtedly robbed the animals of their covering to protect themselves. Food given to the animals was insufficient in quantity and bad in quality,—*dhān*, mouldy rice-straw, and condemned flour being issued; and I pointed out the necessity for change in these matters,—No. 30, dated 22nd November 1879—as well as the benefit that would accrue from having barley, etc., ground in the ordinary country water mills, and the supply of proper clothing and shelter. Over a thousand animals of every class were placed under treatment, Mr. Anderson, who had joined at Kuram on the evacuation of Ali Khel, taking charge, and arrangements were made for the transfer of a large number of the sick to the base at Kohat, that place being recommended by me as the point at which all animals joining the force ought to be inspected, and where the carriage, cost of grain from India, would be less, and for other reasons, vide No. 25, dated 16th November 1879.

Foot and mouth disease was rife amongst the Commissariat

slaughter cattle, and the men in charge seemed to be totally unacquainted with the disease, being under the impression that the lameness arose from the feet being bruised by stones, the mouth sore from eating *bhusa*, etc. Isolation of the sick and proper, but simple, treatment speedily arrested the disease. The cattle were in low order, getting only half pound of condemned flour per diem, and 6 or 7 seers of rice straw or *bhusa*, a rate of feed barely sufficient to sustain life. I also inspected the half battery C.-4th Royal Artillery, which had remained at Kuram, and also the 13th Bengal Lancers. One case of *glanders* was destroyed, belonging to I-8th Royal Artillery, and another of the 13th Bengal Lancers from the outpost of Shalozan.

Having completed the inspection at Kuram, I proceeded on the 24th November to inspect the various posts on the road to Thal, *vide* No. 56. The force intended for the Zaimukht expedition was assembling at Balesh Khel. There were here altogether 228 camels, selected as the best in the force; they were getting a liberal allowance of grain and *bhusa*, but were almost without clothing, and were dying of dysentery and lung complaints, caused by exposure. Slaughter cattle and sheep were in part—those attached to the 86th Regiment,—in miserable condition, and getting no grain, while those attached to I-8th Royal Artillery were better fed, getting barley, and the animals were, in consequence, much stronger, and the meat superior. The mules of the Kohat Mountain Battery were in very serviceable order. Transport for this force was eventually filled up by fresh camels brought up from India, and by small ponies from the Bombay Presidency. These animals proceeded in charge of Veterinary Surgeon Webb, who relieved Mr. Anderson at Kuram.

At "Shinak" a horse of the first Bengal Cavalry had to be destroyed for *farcy*, there were cases of *mange* among transport animals, and camels were dying of dysentery from cold and want of clothing. The horses of the 1st Bengal Cavalry were in low order, those of the 18th Bengal Cavalry, only lately arrived, in excellent condition, with exception of the detachment at Chapri, already beginning to shew the ill-effects of this, the worst post on the line. I drew special attention to the utter want of arrangement for transport animals getting grass at the halting

places. Sanitation was much improved under the superintendence of resident European officers, but progress in this respect was still required.

Arriving at Thal on the 30th November, inspected the various animals in camp, *vide* Nos. 74 and 78, and endeavoured to make hospital arrangements. There was an immense improvement in the arrangement and management of the animals under the superintendence of the officer in charge—Captain Moir,—but there was still great want of clothing, and better preparation of the grain was required. A large sick list consisting of animals suffering from sore-backs and *mange*. Foot and mouth disease had appeared amongst hired bullocks, but was suppressed by isolation and treatment. The commissariat slaughter cattle were in low order, but free from disease. They were receiving a poor ration of three-quarters of a seer of barley with quarter seer of flour and 5 seers of rice-straw. The sheep were free from infectious disease, but suffering much from catarrh, and getting a fairly liberal ration of $4\frac{1}{2}$ chittacks of barley and $1\frac{1}{2}$ of flour, with $1\frac{1}{2}$ seers of rice-straw.

The 1st Bengal Cavalry had suffered much in loss of horses and ponies, principally from *anthrax fever*, induced by hard work, bad food, exposure, residence at outposts on foul ground, &c.

Change to a healthier position was recommended, where good grass could be obtained. Another pony of the mountain battery I-8th Royal Artillery—one out of nineteen left behind by the battery on marching up—was here destroyed for glanders.

1st Class Veterinary Surgeon Anderson passed through on the 14th December with over 1,000 sick animals, gleaned from the line from Kuram down, and went on with them to Kohat. This number was, by the end of the first week in January, augmented to nearly 1,500.

Having completed my inspection of Thal I joined Mr. Anderson on the march, and inspected all the posts on the road. With the exception of one, Ibrahimzai, which was occupied by the 18th Bengal Cavalry, and the horses were in very poor condition. Mote had been in several instances substituted for the barley with advantage. I drew particular attention to this in the report above quoted and to the advantage to be derived from grinding the barley and the facility with which it might be carried out in the ordinary

water-mills, nearly everywhere available, also pointing out the advisability of constructing special ones in the larger stations as Kuram, etc.

Arriving at Kohat on the 20th December, I proceeded with the aid of 1st Class Veterinary Surgeon Anderson to organize the base hospital, a by no means light task, in which Mr. Anderson worked with a degree of zeal worthy of the highest praise. The animals of all classes,—camels, mules, bullocks, ponies, and donkeys,—were in a terrible state of debility with sore-backs, and a very large number affected with mange. The majority of the hired animals were eventually discharged, and the death rate was very heavy. Great difficulty was experienced in getting the owners of hired animals to feed them, although grain and fodder was supplied. The food was frequently stolen and sold, the greatest vigilance failing, I am certain, to prevent this. All these men were much disheartened from being in arrears of pay, and were only too anxious to give up the service and leave; some even deserted, leaving their donkeys, etc., in the lins and their outstanding balance due. I mention this matter, as I feel assured, from my knowledge of Native character, that it was one of the main causes of the neglect of the hired class by their owners; the men got distrustful, and calculated that it would be better even to risk the loss of their property, and take the chance of hire after getting compensation, than serve on. Moreover, they were unable to remit money to their families except such as could be made by peculation. I am further confirmed in this idea by the good condition of hired animals in after months, when pay arrangements were more satisfactory. With the drivers of Government animals it was simply a question of supervision; paid or unpaid, with or without rations, of their own free will they would never do a fair amount of work or care for the animals in their charge. Mr. Anderson obtained money from the Commissariat Department, and made small advances, restoring matters to a somewhat more satisfactory condition. Attention was also given to commissariat cattle, amongst which foot and mouth disease, scab, &c., was prevalent, and several elephants with bad sore-backs were treated. Several cases of glanders, some of them among ponies of I-8th Royal Artillery, were destroyed.

Having completed my inspection of every animal as to age, physical fitness, &c., (*vide* No. 135) seen the hospital fairly started, a full stock of medicines, instruments, &c., having been received, I left on the 14th February to return to Thal, taking Togh, at which a dépôt for camels had been formed, *en route*. Veterinary Surgeon Slattery had reported his arrival at Kohat on 11th January, and been posted in charge of the camp and transport at Thal.

My No. 146 gives the result of this *road inspection*, the *degrees of physical fitness for service, age, &c., of the Camels*,—a very unfavourable return—and the state of the cavalry horses at the posts, mange was very prevalent both in horses and camels, and amongst the latter class of animals, there were also cases of small-pox. Treatment had however been instituted; kerosine oil, *taramera*, &c., being used. The loss amongst the camels here (Togh) getting grazing, grain, sheltered at night under high walls, and bedded down with grass, under the careful supervision of an officer—Lieutenant Cazalet, 1st Bengal Cavalry,—was still very great, amounting amongst the Government class in a period of 58 days to over 40 per cent. of the average strength, and in the hired 33 per cent. The diseases were pulmonary and dysenteric principally. Such simple remedies as could be had recourse to with the native agency at hand were used, and such as with any other class of animals would have met with fair success. I think this case shews how difficult it is to restore to health debilitated camels under any artificial system of management.

An inspection of Thal was now undertaken, the general result of which was reported in my No. 176. The horses of the 18th Bengal Cavalry had fallen off very much in condition, owing to the want of good grass, but they were free from any particular form of sickness. An extra seer of grain or bran was recommended for them. The transport arrangements for feeding, clothing, etc., of the animals were good, but mange was still very general with all classes; and the sick list was a heavy one—over 700. Commissariat cattle, etc., were healthy, with exception of scab amongst the sheep, and were receiving an improved rate of feed. Arrangements for the suppression of mange amongst the camels, by clipping, proper segregation, destruction of old infected clothing, etc., was urged.

Leaving Thal on the 11th February, I proceeded to inspect the various posts up to Kuram. The horses of the 18th Bengal Cavalry had suffered much at these posts in condition, and extra gram was recommended for the lowest conditioned, owing to grass being scarce and bad. A practice in existence of keeping these horses constantly bedded down, was strongly condemned. Cases of mange were observed in both regimental and general transport animals, but treatment was being generally carried out. The error of sending animals up and down the line when affected with skin disease was pointed out. Attention was also drawn to the fact that many of the smaller transport animals could not consume the amount of grain and fodder now supplied. There were some cases of foot and mouth disease detained at the posts, segregated, and under treatment. One case of glanders was also destroyed at Chapri—a transport mule. The transport lines throughout were well kept, and there was considerable improvement in the state of the standings of the postal ponies which heretofore had been neglected.

Subsequent to this all animals at Kuram and Shalozan were inspected—(Reports 179 and 210), and attention was drawn to matters respecting pack gear, especially with regard to that of bullocks, want of proper attention to shoeing of ponies, etc, and loss of condition resulting from sudden changes in the description of grain. A report was also written (No. 196) on the mode of deciding the age of camels with a view to its being forwarded for the information of government and printed for circulation to assist officers in the purchase of the animals and prevent the large percentage of young ones being taken for the service. Closing of the Kohat hospital was recommended as, owing to the large number of animals of the hired class discharged and a number returned to Thal cured, the strength of the hospital was much reduced. The distance from the base at Thal was too great for operations to be carried on successfully in the hot weather.

On the 26th of April I moved to the Peiwar Kotal, and carefully examined all animals there, as well as the daily arrivals and departures, also enquired respecting the grass known locally as *Khika* (supposed to be poisonous), and obtained specimens of it. Having on this tour examined, as far as possible, every animal on

the line, it will be interesting to note here the percentage of different ages, physical fitness, &c., of the various classes:—

Inspected 911 donkeys.

Classed fit for service	...	...	...	107
Unfit	"	"	...	804

Classification as to age.

1 year.	2 years.	3 years.	4 years.	5 to Aged.	Old.
4	52	55	168	508	124

88 per cent. were unfit for service, out of which half that percentage must have been either under four years of age or old at the time of purchase or hire; the rest were physically unfit.

Inspected 2,232 mules and ponies.

Classed fit for service	1,815
Unfit	" " 417

Of these 1,953 were examined as to age, and classed.

1 year.	2 years.	3 years.	4 years.	5 to aged.	old.
4	12	97	140	1,335	365

or about 31 per cent., that must have been under four years of age or old at the time of purchase or hire, some six or eight months previously. However, many of the older animals, especially mules, were well fitted for the service, as will be seen by the fact that out of the total number 2,262, only 447 were actually deemed unfit, notwithstanding their age.

Inspected 1,895 camels.

Classed fit for service	...	1,329
Unfit	" "	566

of which I examined for age 1,658, and classed as follows:—

No teeth.	2-teeth.	4-teeth.	6-teeth.	Full teeth.	Old.
146	268	268	130	840	176

Giving 590 under 4-teeth and old, or 35 per cent. Taking this as the average percentage of the whole number 1,895, it would give about 663 camels unfitted from age, of which however about 5 per cent. were considered physically fit.

Inspected bullocks 686, of which 177 were physically unfit for the service, or nearly 26 per cent.

Examined as to age of these 579, with the following results

4-teeth.	6-teeth.	Full mouth.	Old.
14	23	460	82

Shewing 14 per cent. of the number examined as to age as unfit from being too old. Taking this as the probable average for the whole number, it would give 96 unfitted from age, leaving a balance of 81 as unfit from other causes. The whole number of

baggage animals thus inspected amounted to 5,754, of which 2,326, or over 40 per cent., were physically unfit for the work required of them, shewing conclusively, I think, the necessity of more skill being used in the selection.

On the 13th of May a telegram was received from 1st class Veterinary Surgeon Anderson at Kohat, to the effect that *rinclerpest* had broken out amongst 2,000 head of slaughter cattle at that place; and this was also followed by the information that there were about 500 cases of *foot and mouth disease*. Segregation of the sick had as far as possible been carried out, and the total number divided into several herds at considerable distances apart. I issued instructions for continuous strict segregation, liberal use of disinfectants, slaughter of infected animals, etc., and on Mr. Anderson leaving to take up his appointment with the Khyber Force, Mr. Pringle having marched to Thal with the remainder of the animals from the Kohat hospital, posted Mr. Slattery temporarily to Kohat, and in the end of May left the Peiwar Kotal to proceed to that place myself, inspecting all animals, etc. *en route, vide No. 299.*

The cavalry horses, consisting of the 13th Bengal Lancers at Walli Mahomed and the 18th Bengal Cavalry at other posts down to Thal were all improved in condition, getting ground barley and green grass, which latter, as far down as Alizai, was fairly good; but at Mandori and Chapri very inferior, consisting principally of coarse sedge and "water flags" although there was a vast improvement in the state of the cavalry lines, still, more especially with regard to the portion occupied by the ponies, there was occasionally want of sufficient attention to sanitation.

The commissariat slaughter cattle at Kuram were suffering from diarrhoea, and there had been considerable mortality the previous month from the supply of whole barley and over-ripe green fodder. This ceased on the grain being better prepared and the fodder changed.

The state of the transport was generally satisfactory, and the animals of all classes looking well, free from mange, and with a very small percentage of sore-backs. The state of the portions of the *serais* occupied by the postal ponies much improved at

Thal, with exception of the camels the transport animals were in a satisfactory state, and the lines clean.

There was a large number of sick camels, and the death rate was heavy. These animals were suffering from the heat, and were shortly after transferred to Kuram. Foot and mouth disease also existed amongst them, and I wrote a special report on the subject—No. 304,—pointing out the symptoms and treatment. The horses of the division of E Battery, 3rd Brigade Royal Artillery, of the head-quarters 18th Bengal Cavalry, and of a detachment of the 1st Bengal Cavalry were healthy, but all more or less “light” from want of sufficient good grass. The commissariat cattle and sheep healthy, and getting a good rate of feed. I had an opportunity also of examining as to age, 399 newly purchased camels marching up to Kuram, and found the average of immature animals to be about 36 per cent., with a slight percentage of old animals.

From Thal I proceeded by tonga to Kohat, arriving on the 7th of June. Rinderpest had been somewhat severe during the month of May, the loss from the 13th, the date of the outbreak, to the 31st, being 110 head, they having died or been destroyed. The disease appeared to run its course extremely rapidly, diarrhoea, as is usually the case in India, not being a marked symptom. There was, however, a decline in the beginning of June, six animals only dying or being destroyed from the 1st to the 13th. From the latter date to the 24th however, the mortality increased, 28 deaths or destructions being recorded. Seven of these cases represented a fresh outbreak amongst some Commissariat bullocks, owing to some of the segregated cows having escaped from the enclosure in the night and got mixed up with these animals. By taking the temperature of all the sickly, and by prompt destruction of all such as shewed a marked elevation, the fresh outbreak was arrested, and the loss up to the 8th July was only six, and from that date ceased altogether. The outbreak appeared to be purely local, but I took the precaution of telegraphing to Veterinary Surgeon Queripel, in charge of the Rawal Pindi Road, on first hearing of it.

On arrival at Kohat I despatched Veterinary Surgeon Slattery to Kuram, where small-pox had appeared amongst the Commis-

sariat sheep,—there being no veterinary aid nearer to that place than Shalozan, 10 miles distant, and the duty at that Camp, in charge of Veterinary Surgeon Webb, being heavy.

Severe sickness had in the meantime occurred amongst the camels collected at Shalozan, and on the 20th of July I received orders from the Major General Commanding to proceed as expeditiously as possible to that place. Starting on the 21st, I reached Kuram by double marches, on the 28th, inspecting the road posts through the whole distance. Between Kohat and Thal I found the horses of the 1st Bengal Cavalry, with few exceptions, beginning to shew improved condition, green grass being obtainable in moderate quantities; but more attention was required to the grinding of grain, especially barley, and sanitation of the lines was not fully attended to; other portions of road *serais* were very dirty and standings of postal ponies neglected, *vide* Report No. 369.

Thal.—I had no opportunity to inspect, as I passed through too rapidly. Between Thal and Kuram the Cavalry horses were in fair order, and ground grain and green grass were being supplied to them. The lines, with few exceptions, notably Shinak, were well-kept. The few camels at the posts were suffering from skin disease, and deaths were frequent. On reaching Kuram, I at once proceeded to inspect the camels, which had been removed to a camp at the village of "Zeran." The result was reported in my No. 357 and will be further dealt with in the description of the disease from which they were suffering. To the end of September, with the exception of about ten days, during which period I was incapacitated from illness for the performance of duty, I was engaged in supervising the treatment of the camels, and inspected the whole of the upper Kuram Brigade, consisting of C. Battery, 4th Brigade, and No. 1 Mountain Battery, 8th Brigade, Royal Artillery, the 13th Bengal Lancers, with the brigade transport of the 2nd Battalion 8th Regiment, the 85th Regiment, the 20th, 21st, and 29th Regiments of Punjab Infantry at the camps of Kuram, Shalozan, Barra Iman, and Habub Kila, *vide* No. 405. There was a slight outbreak of *rinderpest*, and also a case of glanders in the 18th Bengal Cavalry at Thal; but happily, under the preventive measures adopted, neither disease extended. Owing to Mr. Pringle having contracted fever at Thal, at the recommendation of the medical officer, I obtained his transfer to Kuram, Mr. Slattery taking his

place. The latter officer, however, speedily succumbed to the very severe type of fever prevailing, and the camp being without veterinary aid, I proceeded to it myself on the 3rd October. As several cases of glanders had occurred among a large number of ponies and mules sent from the Khyber column, and recently marched up to Kuram—Reports Nos. 410-411,—I carefully inspected every animal on the road, but without detecting any cases of the disease, Report No. 441. Horses of the 18th Bengal Cavalry at Balesh Khel, and Shinak and a mule at Mandori, were suffering from the disease known as *surra*. At Thal also the horses of this regiment, although in good condition, were suffering severely from this disease. The horses of the division of E. Battery, 3rd Brigade, Royal Artillery, were in good condition and healthy. A case of glanders was also destroyed in the regiment, and two Peshawar ponies in the transport lines. Mr. Pringle having joined at Thal from Kuram, the force retiring from the valley, and a case of glanders being reported in the 1st Bengal Cavalry at Gandour, I deemed it advisable to inspect the road to Kohat in advance of the troops marching down, and with the permission of the Major-General Commanding, left on the 16th of October. I found the horses of the 1st Bengal Cavalry much improved in condition and free from glanders. There were, however, a few cases of the disease *Surra* at Surorai in horses withdrawn from the outposts in the immediate neighbourhood of Thal—*vide* Report No. 448. Arriving in Kohat on the 20th October, I was struck off the strength of the Kuram force from that date.

SPECIAL DISEASES.

Glanders.—Although a number of isolated cases of this disease occurred, yet, by careful inspection of animals, and prompt destruction of the diseased, any very extended loss was avoided. There had been two cases in Kohat prior to my arrival in September 1879 amongst transport animals, both of which had been destroyed by order of a Station Committee. At Ali Kheyl, in October, the disease again appeared in No. 1 (Mountain) Battery 8th Brigade Royal Artillery, two mules or ponies proving on inspection to be affected with acute glanders. One more case occurred at Ali Kheyl, and a fourth amongst some of the battery ponies sent back to

Kuram in November. In the same month I detected a case of the disease in a horse of the 13th Bengal Lancers at Shalozan, and later on, passing down the line, in a horse of the 1st Bengal Cavalry at the outpost of "Shinak." At Thal, in December, one more of these ponies left behind by the battery on its march was found affected and destroyed, and later on two more of these animals in charge of the Commissariat at Kohat.

These latter two cases were totally unsuspected by the attendants in charge of them, were stabled with a number of other animals, and when detected by Mr. Anderson were on their way to drink at a brook used for the same purpose by about a thousand other ponies and mules. One case also occurred in a batch of transport ponies from Jhelum.

In February 1880 five cases occurred at Thal amongst transport animals, and in the following month I destroyed an affected mule in the transport lines at Chapri. In April one case occurred in the 13th Bengal Lancers at Kuram, and the column was then free from disease till September, when a case was reported in the 18th Bengal Cavalry at Thal; also several large draughts of ponies sent from Peshawar brought the affection up to Kuram, five being shot at that place in September and October, and two more ponies and one horse of the 18th Bengal Cavalry in Thal in the latter month. These ponies were ultimately marched down to Rawal Pindi for final disposal on the breaking up of the Kuram Force, and several cases occurred on the road, and one had according to my latest accounts been destroyed at Rawal Pindi.

On the whole, considering the large number of animals with the force, the comparative immunity from glanders and farcy, and the success with which its periodical appearances were suppressed, is satisfactory. The arrival of the affected ponies from the Peshawar line at the last moment was unfortunate, as it rendered spread of the disease into India by the retiring troops more than probable. Strong representations were made on my part to the authorities, touching precautionary measures to be adopted!

Mange.—This troublesome skin disease made its appearance early in October amongst the debilitated, dirty transport animals, and, there being but few remedial agents at hand and but slight

Veterinary supervision, spread with great rapidity to all classes of transport animals, as also in a slighter degree to animals of the other branches of the service, private horses, etc. By the free use of such agents as *tara mera* oil, Kerosine, etc., diluted with oils of a milder nature, under increased Veterinary supervision, and an extended knowledge of the nature of the affection amongst officers in charge of animals, owners, etc., it was, by the month of April, quite suppressed. There were, however, signs of its presence evinced by the Peshawar line ponies on their arrival at Kuram, and I fear much, a fresh outbreak was probable.

Anthrax Fever.—This disease was very prevalent from the month of September to December 1879 at Thal and the outposts between that place and Balesh Khel; the horses of the 1st Bengal Cavalry occupying this part of the line, and the postal ponies suffering very severely; there being also a considerable number of isolated cases among the transport ponies, etc. A few cases also occurred in the upper part of the valley at Kuram and Shalozan, and also two well marked cases in the battery (E-3rd. Royal Artillery) at Kohat. The cases I had an opportunity of seeing at Thal and on the line were of a very severe type, death frequently occurring in a few hours. In addition to the well known symptoms of local swellings, effusion of yellow serum, occasionally blood, from the nostrils and eyes, petechiæ on the visible mucous membranes, etc, there was in cases of a more prolonged description, ulceration, or rather sloughing, of the mucous membranes of the nasal cavities. Of some of these latter cases—animals in hopelessly debilitated condition,—I recommended their destruction. In a few cases I had an opportunity of treating, I found the administration of carbolic acid, meet with the happiest results,—swelling subsiding, pulse regaining tone, temperature falling, etc., in a period of 48 hours.

The disease was however only eradicated from the 1st Bengal Cavalry by removal to fresh ground and more open country in the neighbourhood of Togh and from the outposts by improved sanitation. I need not enter here into a description of the state of these outposts in the latter part of 1879, or the recommendations made by me for the improvement of their sanitary condition, as these matters have constantly been referred to in my reports; but

merely state that the extreme want of cleanliness was, I doubt not, the cause of so much loss in animal life, and with improvement in this respect, mortality ceased.

Surra.—The malady known by this name on the frontier appeared amongst the horses of the 18th Bengal Cavalry in the middle of August, continuing unchecked up to the date of my leaving the force. It originated between Chapri and Balesh Khel and appeared to me to continue to spread in the ranks of the regiment at head-quarters at Thal. I have already placed before you such conclusions as I was able to form of its nature during my last visit of inspection, and as I understand Dr. Evans has been recently engaged in a minute investigation of the same disease you are probably in possession of much fuller information than I can give. I may briefly recapitulate the symptoms and *post mortem* appearances. Prolonged fever with constipation of the bowels and an absence of biliary secretion; thrilling pulse; in the early stages increased urination; extreme pallor, occasionally yellowness of the mucous membranes, with presence of petechiæ; œdema of the head, body and extremities; death after 15 to 20 days, or even a longer period, preceded by violent convulsive action of the limbs, often lasting for 48 hours.

Post Mortem examination revealed general pallor of the body with disorganized blood forming weak clots, and sub-acute inflammation of the liver and peritoneum. The disease evidently arises from the admission of some element into the blood causing a somewhat slow degeneration of it, rendering it unfit for nourishment of the tissues, and finally causing death by its inability to supply the brain, etc, with proper nourishment. It differs entirely from *anthrax*, in there being no rapid death of the blood, or tendency to putrefaction. The animals affected were in good condition, and living under fairly favourable sanitary conditions. From the fact that at the places I alone noted the disease, viz., Balesh Khel, Shinak, and Thal, water from irrigation channels and other more or less impure sources, was more easily obtainable than that from a purer source, my suspicions point to the water as the most probable cause. The disease is one I have heard frequently mentioned as occurring on the frontier but I have not previously had an opportunity of seeing it there, or

met with it in any other part of India. The remedies recommended were,—a mild laxative, counter-irritation over the liver, the administration of carbolic acid, diffusible stimulants, tonics, &c., and the propriety of removing the regiment from Thal, if possible, was also suggested.

Other diseases were of the ordinary types met with in practice. Diseases of the respiratory organs were not as common as might have been expected from exposure to severe cold of large numbers of animals. Digestive derangements too, considering the very coarse nature of the fodder and grain, were not particularly marked. Once a system of clothing and feeding the transport mules and ponies was established mortality fell to a very low standard; but large numbers succumbed in the early part of the winter to exposure to cold and want of proper food. Wounds formed a very large proportion of cases in hospital, and were principally sore backs caused by ill-fitting pack saddles and bad loading, these were frequently of a very serious description, extensive sloughing of bruised skin taking place, deep-seated abscesses, sinuses, and injury to the bones of the spine, [resulting in animals being incapacitated for service for many weeks, or rendered altogether useless.

After the first few months sore-backs were reduced to a minimum, but I regret to say that when the heavy strain fell on the animals, of removing commissariat and other stores to the base, preceding the "retirement" from Kuram, the number was very much increased.

CAMEL DISEASES.—As but little has been heretofore known of the diseases affecting the camel, I will try to give as full a detail as possible of what I was able to glean with regard to them.

Dysentery—In the winter of 1879-80 a very large number of these animals perished from dysentery, induced by cold, want of clothing, and a scant supply of coarse and indifferent fodder. The symptoms were profuse, foetid, watery evacuations mixed with mucous and in the latter stages, blood. The animals attacked being generally in a debilitated condition as a rule, speedily succumbed to the disease or to lung complications, caused by cold. Opium and catechu, of each two to three drachm doses, given night and morning, with mild stimulating doses of rum, six to eight ounces, diluted with water, proved beneficial, and frequently

when combined with warm clothing, shelter, the supply of green leaves instead of blusa and barley, saved the animal's life. But it was too frequently impossible to supply these valuable adjuncts to the medicines. One to two pound doses of ghee were also useful in clearing out the bowels of irritating ingesta.

Pneumonia, bronchitis, etc., evinced by the presence of a sore cough, quickened respiration, and profuse rust-coloured muco-purulent discharge from the nose were very common. In these cases too, warm clothing and shelter were essentially necessary to recovery. The administration of opium in half tolah doses with *bhang* (green Indian hemp) in 2-ounce doses mixed with coarse sugar (*gur*) and supporting the strength by feeding by hand with ghee, flour, etc., and diluted draughts of rum and water, offered the best chance of success. Friction, too, to the throat and chest with oil of turpentine, often repeated, had beneficial effects.

Colic.—A not unfrequent affection, both of the spasmodic and flatulent type. In the former, the pain is severe, and owing to the excitement of the animal and his violent struggles, the exhibition of remedies is not always a very safe operation. However with good camel men, the animal can generally be secured and warm ghee, containing a full dose of opium rubbed down in it will generally procure relief.

In the second type, or tympanitis, the animal is not so violent. The belly will be seen enormously distended with gas. I found in all cases of this type the ordinary native remedy, oil or ghee answer perfectly,—the flatulence, after a liberal quantity has been given, subsiding rapidly. I prefer ghee or such mild oils as *til*, but the *tara mera* oil given in half-seer doses, a common remedy with the camel men, also answers the purpose.

Megrims.—Closely allied to the above affections, inasmuch as it arises from sympathy of the brain with an over-loaded stomach, is the disease vulgarly known as megrims or staggers. The animal appears dull, heavy, and stupid, but will suddenly wake up into a state of frenzy, rush wildly about, fall and remain struggling on the ground, the mouth of a livid blue colour, saliva flowing from it. The native remedy is in the first place bleeding, and secondarily oleaginous purgatives, and this mode of treatment seemed to be fairly successful. They mostly bleed by cutting the palate,

often inducing a not inconsiderable flow of blood. However, the Jugular vein can very readily be opened with a lancet, the vessel being of large size, and easily distended by pressure on its course with the fingers.

Partial recovery is often followed by relapse, tympanitis, complete stupor, and death.

Hydatid cysts.—A very common cause of loss in camels. Their presence, is marked by rapidly increasing debility, with hard dry skin clinging tightly to the bones, frequent dry cough, pallor of the mucous membranes of the mouth, etc. On *post mortem* examination the liver, spleen, lungs, etc., will be found so thoroughly occupied by these cysts, often as large as oranges that it is wonderful how the functions of the organs could have been carried on so as to prolong life to the extent reached.

Foot and mouth disease.—Although of a serious nature, with regard to rendering the animal useless for a considerable period, if not properly attended to, is not a very fatal disease. Its characteristic symptoms are very well marked. As a rule, attention is generally called to the camel affected, by acute lameness; and on examination there will be observed swelling in the neighbourhood of the foot or feet, with raised vesicles on the margin of the skin and horny sole. These rapidly burst, discharging their fluid contents, and giving place to raw patches, often, when two or three unite, of considerable size. Although it does not follow that both mouth and feet are affected at the same time, yet very commonly there will be a discharge of saliva from the mouth, and on inspection, vesicles, or the resulting raw, red, bare spots from their having burst, will be seen. With regard to treatment, the mouth may be left to nature; but the feet require considerable attention in keeping the sores clean, and some simple dressing, as carbolic oil or turpentine and oil applied. Otherwise troublesome ulcers may result, the discharge from the sores burrowing down under the horny structures of the pad or sole of the foot, may lead to its being cast off in whole or part, and the camel rendered useless for months, or perhaps altogether. The disease being infectious, it is necessary to separate the sick as far as possible from the healthy.

Anthrax fever.—This is a very serious malady in the camel, and

caused enormous loss in the space of a few weeks in the Kuram Force, spreading rapidly, and running its course in a very short period. The symptoms of the disease are not so well marked as in other classes of animals, or our want of familiarity with the habits, &c., of the camels renders us less acute in detecting them. They may, however, be taken as a refusal of food; dull eye; drooping œdematous eyelid; yellow or bloody serous discharge from the nostrils; occasionally swelling under the throat; the lining membrane of the mouth and eyelid deeply congested, with commonly black patches (petechiæ); the pulsations of the heart rapid and weak; bowels constipated, the dung being passed in extremely small balls covered with mucous; the affected animal will be frequently found prone on its side, evincing evident abdominal pains by looking round, kicking at the belly, &c., while percussion will give back a dull, heavy sound shewing the presence of fluid in the abdominal cavity. Death follows, frequently in a few hours after symptoms of indisposition are noticed, too often before they are noticed at all in large herds of animals, and I have seen many instances of animals dying within a few moments of loads being removed from their backs. In one instance, a riding camel accompanied me for a distance of six or seven miles, going at an easy pace, shewing no signs of indisposition to me, or apparently to his rider, and yet was dead within an hour of being dismounted. On another occasion, out of some two or three hundred camels marched, without loads, a distance of 14 miles, about a dozen were dead or dying without a few hours of arrival. Another type of the malady, more prolonged in duration, but equally fatal, takes the form of acute diarrhœa, generally refusing to yield to any medicinal agents, proving fatal in from three to four days; or if cessation of the diarrhœa does result on treatment, death usually occurs from other effects of the disease,

If the symptoms during life are not easily detectable, or death takes place too rapidly to allow of their detection, the *post mortem* appearances are too marked to allow of any doubt of the nature of the affection. I may for convenience divide them into three classes.

1st.—Those animals in which death has not taken place for some hours after the symptoms of indisposition, as already described, have been noticed: Effusion of serum, of a slightly red

tint in large quantities into the cavities of the abdomen, thorax, and pericardial sac. When allowed to flow out on the ground this fluid will partly coagulate, forming a gelatinous like mass, and such tinted gelatinous like matter will be found at the base of the heart, along the course of the great blood vessels, trachea bronchial tubes, etc., and also in the parenchyma of the lungs and around the kidneys. Not uncommonly there will be found masses of dark, semi coagulated blood effused into the substance of the lung tissue, forming tumours as it were on the surface, and the same appearance is observed in the spleen, which is sometimes gorged with blood, but not invariably so. In some cases the effusion will take place into the throat, the larynx, etc., being imbedded in it, and the pharynx intensely congested, but this appearance is not so common as in other classes of animals, indeed I noticed but few cases where the effusion was in the areolar-tissue in immediate contiguity to the skin. The liver clay coloured granular in texture, easily broken down, the capsule having externally large patches of mulberry coloured stains, an appearance seen also on the surface of the heart and throughout the external surface of the intestines, parietal peritoneum, etc. Almost invariably the abomasum and duodenum are intensely congested, of a dark mulberry colour, approaching black, and thickened to a considerable extent from effusion into the visceral tissues. The small intestines internally pallid throughout, except in spots where congested or discoloured glands shew prominent and dark. The large intestines contained excrementitious matter dry and hard, coated with mucus sometimes adhering closely to the mucous membrane, the epithelium adhering closely to the pellets on removal. The mesenteric glands enlarged and dark-coloured, and the mesentery of a leaden hue, traversed by dark vessels.

2nd—In the second variety, animals which die with few premonitory symptoms, on being put to exertion, etc., the effusion is found to be excessive in the pericardial sac, the other cavities being comparatively, if not altogether, free from it, and death would appear to take place from the actual action of the superimposed fluid on the heart itself.

In the form in which diarrhoea forms the leading symptom, the *post mortem* appearances depend greatly on the stage in which the

animal died. If death resulted during the flux itself, little or no fluid is found in any of the cavities. The fourth stomach and commencement of the small intestines, as already described, are found congested, the whole length of the small intestines, except the duodenum, as a rule pallid, but occasionally with engorged vessels. The large intestines have much the same appearance, except that the mucous membrane is divested of its epithelium in patches, corresponding to the shreds frequently seen passed with the evacuations. If, however, treatment or the efforts of nature has succeeded in arresting the diarrhœa, it not unfrequently happens that serum is observed in the abdomen, &c., in considerable quantities, as if metastasis, as it were, had taken place. The blood throughout the body and in both cavities of the heart dark coloured, with but little power of coagulation, tar-like in appearance, and containing bubbles of gas. Decomposition speedily sets in after death.

This particular form I have no doubt whatever is conveyed from sick to healthy animals by cohabitation, whether by atmospheric influence or by contagion, the result of virus contained in the discharges conveyed from one animal to the other by the hands of attendants, or by food or water becoming contaminated, by which of these channels it would be difficult to say, but that such transmission of the disease takes place, I had ample proof by sound animals, mixed by the carelessness of the attendants on more than one occasion with the sick, and afterwards detained under observation by me in consequence, invariably becoming affected in a period of from four to five days. It was for this reason, taking into consideration the fatal nature of the disease, and the utter impossibility of carrying out proper segregation, owing to the confined area allotted for accommodation of transport animals, that I wished, as already reported, to destroy these cases in the late outbreak.

It will be evident from a perusal of the post mortem appearances that there is a resemblance to those frequently found in rinderpest; but there are absent some marked features of that disease,—the aphthous appearances of the mouth and also of the intestines and striated congestions of viscera, while the peculiar effusion of anthrax is marked.

On the 29th of May 1880 I examined the camels then at

Shalozan, and found them looking remarkably well, free from this disease, etc. I also inspected 649 more on the Thal road, marching up to Kuram with stores, and found them healthy and in fair condition. At Thal, at that time (6th June), there were about 140 camels sick, weeded out from the various convoys arriving there from up the line, and these were all in poor condition; and the death rate was high, in the opinion of Veterinary Surgeon Pringle, formed from *Post Mortem* examinations and the results of treatment, from brain congestion. Shortly after 10th June these animals were ordered up to the cooler climate of Kuram and Shalozan, arriving about the 17th to the 20th. At the end of the month the death-rates appear to have increased simultaneously at both these places, and further extended to an alarming degree in July. Veterinary Surgeon Webb, reported all the camels to be in miserably low condition at Shalozan, and a similar account was received from Mr. Slattery at Kuram. I directed these officers to use every effort in their power to ascertain the nature of the disease, and to make such recommendations as they might see fit as to change of food, etc.

I left Kohat where I had been engaged in the suppression of an attack of rinderpest amongst the slaughter cattle in charge of the commissariat on the 21st July, and proceeded by double marches to Kuram, arriving on the 28th. I found that the majority of the camels had been removed into camp at "Zeram," a village immediately under the "Safed Koh" range, with a view to their getting green food on the lower slopes of the hills. On proceeding to inspect the camp, I observed that the situation had been badly chosen in some low-lying fields, subject to be swamped daily by the rainfall. While Kuram, in the more open part of the valley, was but little visited by storms, at this place they were of daily occurrence, and the animals literally waded in from their feeding grounds, and spent the night in a morass of foul mud mixed with dung and urine, the stench from which was intolerable when the sun shone on it. Dead Camels lay on all sides in every stage of decomposition; even in the streams from which the sole supply for drinking pur-

poses of man and beast was drawn. Here was sufficient foul air, foul water, foul ground, cold and wet, to produce any extent of death-rate. I proceeded to inspect the grazing grounds, situated in a sheltered valley, and well supplied with herbage of a suitable description, and selected an elevated knoll in the middle, well drained, and in an open breezy situation, to which I recommended the camp to be removed, which was accordingly done; and efforts were made to drag away the carcasses to a more distant spot, with however but partial success. Daily rain-fall and the accumulation of rotting bodies soon rendered this spot as unwholesome as the former, and the death rate continuing undiminished,—419 died in a period of 17 days, from 22nd July to 7th August inclusive, giving a daily percentage of 2.5 on the average number present, viz., 919. I proposed the removal of the camp to the drier climate in the neighbourhood of Kuram, occasional change of its site as the ground became fouled, separation of the total number into smaller bodies, if possible, avoidance of use, *pro tem*, of the old enclosures, and destruction of the dead by fire. The measures were in part carried out, the camp being moved, and an attempt, not very successful, owing to the scarce supply of wood, made to burn the carcasses. Rain too, which had before been very slight at this place, fell almost daily, and had a very prejudicial effect; the mortality, however, decreased at the rate of about half per cent. per diem. After a week further the camp was broken up, and the camels sent to the old enclosure at Shalozan, from whence they were shortly after draughted out for work, the death-rate still continuing heavy, and I fear the result of the epizootic can but be considered practically an annihilation of the camel column of the force, 1,400 dying in the months of July, August and September at Kuram, Shalozan, and the camps attached; 217 on the road between Kuram and Thal in the two latter months, and 61 at Thal. These figures are approximate, there having been a number of deaths at various points which I had not an oppor-

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tunity of registering. Such medicinal treatment as it was possible to adopt was tried ; I myself attending to a large number of cases, and giving fair trial to such remedies as were suggested by the native camel-men, principally the use of Indian hemp, opium, catechu, diffusible stimulants, carbolic acid were all tried in turn, the animals being fed by hand with ghee, coarse sugar, flour, etc., and supplied with green food ; but no remedy, medicinal or alimentary, seemed to have any decided effect. Of those treated for diarrhœa, about 75 per cent. died without shewing any alleviation of the symptoms at all, and of the remainder, in which the urgent symptoms passed away, at least half died from effusions into the cavities when apparently on the eve of recovery. Of those in which this particular symptom was not manifested, a large number died when out at graze on the road-side or in the lines at night. The measures which were undoubtedly requisite were, 1st, division of the total number of camels into several small herds ; 2nd, extreme cleauliness with regard to the lines, etc. ; 3rd, supply of green food ; 4th, destruction of diseased animals ; and 5th, destruction of all carcasses by fire, burial being impossible owing to the rocky nature of the soil. With regard to the 1st,—It was difficult, if not impossible, to arrange, as each separate division would have required a military guard to protect it. 2nd,—Cleauliness was attended to as far as possible, but under the circumstances described in former paragraphs, with respect to the camp at Zeram, this was not always attainable. 3rd,—Supply of green food was only obtainable by removing the animals to the foot of the hills, which was done in the case of the Zeram encampment, but the bad weather more than counter-balanced the good results attained. 4th,—Destruction of diseased animals. The non-compliance with my suggestions on this point was, I am convinced, an error. I have not been favoured with any specific reasons for the course adopted, and in the face of the fact that there was nothing to lose by the destruction of animals suffering from an incurable disease, while much was to be attained by the removal of infectious or contagious centres. I fail to understand it. With reference to the manners of the spread of the disease, actual contact of the virus

with abraded surfaces in the animal's mouth, from soiled food, or tainted water, is the most probable solution, all the mouths being sore, principally from ulcers caused by the *bhusa* on which the animals were fed, wounding the buccal membrane. Proper segregation, from the reasons already given for the non-separation into smaller herds, was impossible. It was absolutely necessary to keep the sick animals within the walled enclosures, or in camp in close proximity to the healthy; and, although the two classes were kept as far apart as possible, from carelessness of the attendants, they were constantly being mixed.

Skin disease.—Another formidable class of diseases affecting these animals, and from the close contact in which they were kept very difficult to prevent the spread of.

Mange of the true parasitic description was very common from November 1879 to the following March, but effectually stamped out by April, by the use of *tara mera* oil, kerosine, etc. These remedies are too powerful when applied undiluted. Although the natives use the former extensively with camels, but mixed with more bland oils, they are valuable. The symptoms were of the usual description, intense irritation, falling of the hair, injury to the cuticle from biting, scratching, etc., thickening of the skin, and a rugose appearance. The insect was of considerable size, was easily obtained by removing some of the scurf, hair, etc., and exposing it to the sun in a piece of white paper. The affection spread with great rapidity to almost every camel of the force from want of due attention, and was kept alive by an injudicious system of working affected animals, notwithstanding veterinary opinion to the contrary. Clothing was also with difficulty disinfected, many months elapsing before a boiler could be established at Thal, in which to prepare hot water for dipping purposes, and the destruction by fire of old clothing being long delayed.

Eczema.—I have so called an eruptive disease, which affected all the camels, more or less, in the latter part of the year, and probably arose from derangement of the digestive system, from dry indigestible food. It consisted of a crop or successive crops of nodules or pimples extremely itchy on first appearance, but not so

acutely so or hardly so at all, when fully developed. An albuminous fluid oozed from the surface of summits, gluing the hairs together, and when situated on the inner sides of the thighs or sheath of the penis, a favourite situation, this discharge accumulated in a thick crust. On separation of the crust, the site of the original nodule was marked by a round white spot of smooth skin. Although many animals were attacked at the same time, the disease appeared to be non-contagious, and readily yielded in the second stage to dressings of oil. This is the disease commonly known amongst the natives as "kharij" or itch, and is treated by them with external applications and internal administration of *tara mera* oil.

Small-pox.—I noticed on several occasions, but more particularly at the camel camp at Togh, a well marked and highly characteristic outbreak of variola. Circular raised visicles, containing a limpid fluid, which gradually assumed a turbid character; the pustule dried up, cupping in the centre, and forming a yellowish brown scab, which finally separated, leaving a well-defined "pit" more or less permanent, but difficult to find when contraction had taken place and hair grown around it. When confluent, or injured by rubbing for itchiness was a marked characteristic, extensive sores were created, and several animals had to be destroyed on this account. In many cases the disease ran its course in a mild manner, and by keeping the affected animals as far separated as possible, any very wide spread of it was avoided. I however, in examining camels, frequently came across the scars. In connection with this, I may add that a camel driver presented himself to me with undoubted small-pox, which he stated he had caught from the camels, and which his comrades seemed to consider a usual occurrence. They also recognised the disease by the ordinary name of "Mata."

Lice of a large description also affect the Camel, and may be seen in great numbers, causing considerable annoyance. They are speedily removed by the use of tobacco water.

Wounds.—These form a very serious item of the sick list of this class, more especially those arising from ill-fitting pack saddles. The "hump" fitting into an aperture made for the purpose bet-

ween the two pads of which the saddle is composed, generally escapes injury, but the "wither" immediately in front of it, being under the front wooden "tree," is, when the animal is badly loaded, the weight being too much forward, the seat of severe bruises, abscesses and sinuses; in the same way, when the posterior part of the saddle receives undue weight, or from want of stuffing, etc., severe injury accrues to the region of the transverse processes of the lumbar vertebra, which, bones being long and prominent, covered with but little soft structure, especially in low-conditioned animals, offers considerable facility for this class of injury. Abscesses with thick walls are very common in this part, which bursting, or being opened, give exit to a quantity of cheese-like pus, and remain in an indolent, unhealed condition, the subject of fresh irritation from the saddle, etc.

Sinus of the horny pad under the chest is a very troublesome affection and difficult to cure without laying the animal up for a long period. At the same time, it is of an extremely serious nature, as the Camel from pain will remain standing, and suffers greatly from fatigue.

Gall between the point of the elbow and ribs, or prominent edge of the sternal pad, is a very common occurrence in ill-shaped, narrow chested camels with turned out toes, and when chronic in this class, tends to render the animal almost useless or at any rate a very painful spectacle when kept at work. In the selection of Camels, those thus malformed should be carefully avoided. *Abscesses* over the eye are frequently seen, the upper eyelid being generally infiltrated with pus. These generally contain laudable pus, and heal rapidly when the contents are evacuated with a lancet, but tend to form bad sores when allowed to rupture of their own accord, and to become impregnated with dirt. They probably arise from contusions. The same remarks apply to small abscesses which form about the mouth and upper lip. These arise from injury to the buccal membrane from *bhusa*, thorns, etc., or from the latter cause to the skin of the parts.

Bruises or injuries to the feet from stones, neglected foot and mouth disease, etc., are apt to take on suppurative action and form sinuses under the horny sole, causing separation of that

structure and prolonged lameness. The healing process in the camel is of a sluggish nature, there being a great tendency to the formation of a low unhealthy type of pus in all wounds, and maggots are especially common. Sharp, stimulating dressings are required as strong carbolic solution and turpentine liniment. It is probably on account of this peculiar disposition in wounds that the natives are so fond of the use of the actual cautery to them. Sinuses require freely opening with the bistoury, otherwise the contained matter will burrow to an unlimited extent. For the destruction of maggots, oil of turpentine is unequalled. The natives have many agents for this purpose, of which quicklime is perhaps the mildest; but most of these end in the destruction of tissue to a serious extent. *Sitfasts* or portions of dead skin from saddle pressure, separate very slowly, ulcerating indolently round the edges, and giving exit to their pus, often covering a considerable amount of dead areolar tissue and tissue infiltrated with decomposed pus and other results of mortified flesh.

The free use of the knife in these cases is very essential, dissecting them thoroughly out; but it must always be borne in mind that where these sitfasts are small, thin, not involving any depth of tissue, and free from fluid underneath, all of which can be ascertained by careful manipulation, it may be better to leave them to the course of nature rather than unfit the animal for work by making an open sore.

Wounds, even of a tolerably serious character, about the back, need not prevent a camel working, if only due care be taken to fit the saddle, the pad of which, consisting as it does, simply of straw stuffed sacking, can easily be cut away to prevent pressure on the wound, and the latter can be kept clean and dressed daily. I fear, however, this was often not done. Loaded up and started in the early morning with a long march before them, the camels only arrived at their destination in time to be unloaded and fed, and on arrival at the terminal depôt were restarted within 24 hours or less, before, in cases of several hundreds of them, proper arrangements could be made to thoroughly inspect them.

Edema of the extremities frequently affects camels to a considerable extent, either the result of overwork or debility. It is generally called "Zerbad" by the natives, but this term is very widely applied to obscure affections. Rest, green food, laxative doses of any of the common oils will generally effect a cure.

Medicines, etc.—The administration of medicine to the camel is a very simple operation. The animal being made to sit down, and if troublesome secured by his foreleg being tied to the arm as doubled under him, the medicine, if fluid, is simply poured down his capacious throat, any vessel such as a jug or even a bucket, being used for the purpose. If dry, a ball, the size of a cricket ball, is dropped into the mouth, and crammed down with a stick. Spices and peppers, with coarse sugar (*gur*) and ghee are freely given by the natives as well as *bhang*, the dried leaves of the Indian hemp. Ordinary rum is an invaluable stimulant, and half a bottle of it slightly diluted has given strength to many a weary animal to reach the next encamping ground.

Bullocks.—Of these animals a large number were employed by the Transport Department for pack purposes. The diseases from which they suffered most were—

Foot and mouth disease.—In the beginning of the Campaign, this threatened to prove of serious consequence; but by separation of the affected and due attention to the sores, it was stopped, and although it periodically cropped up at various parts of the line, was on each occasion arrested before it had time to spread. From the sores in the feet being frequently confounded with injuries received from stones, there was danger of the malady not being recognized by attendants, etc., in time to prevent its spread. The different seats of the two descriptions of sores, that of foot and mouth disease between the digits, and of the latter on the pad of the heels, were markedly distinctive, and once this became generally recognized, cases were speedily brought to notice.

Dysentery.—Many animals perished from this in the winter months, induced by exposure to cold and improper food. Unhusked rice, mouldy flour, coarse rice-straw were agents very productive of it, and these were aided by want of clothing. Provision of

clothing, shelter, change of food tended to stop the continuance of the disease, and opium proved a valuable medicinal agent.

Rinderpest.—A few cases occurred in Thal in August 1880, but by prompt isolation, its spread was prevented. Considering the extent of the attack of the disease at Kohat in two months previous to this, it is a matter for congratulation that the line was kept clear of this deadly disease.

Mange.—As with every other class of animal, bullocks suffered severely from this ; but it was eradicated in the early part of the year by the use of ordinary dressings, destruction of old clothing, isolation, etc.

Wounds, especially sore-backs from improper pack gear, were extremely common ; in fact, the bullock carriage of the force was in a great degree rendered useless by this cause. On this subject I shall have more to say further on. A free use of the knife was very essential in treating these cases ; but once exit was given to imprisoned pus, dead skin, etc., removed, the healing process was fairly rapid under the application of ordinary dressings, as carbolic oil. etc.

Of mules and donkeys. I need write no more than has already been said under the heading of equine diseases. I may mention, however, with regard to the last-named class, that no cases of glanders occurred amongst the many hundreds present with the column.

Commissariat animals —Slaughter cattle,—mostly cows. The animals suffered severely from foot and mouth disease at Ali Khel and Kuram in October and November 1879, and there were also a number of cases at Thal and Kohat. There seemed to be perfect ignorance of the nature of the disease amongst both European and natives in charge of these animals, as I have already pointed out in treating of pack bullocks, the lameness being ascribed to bruising of the feet by stones. I am glad to say that eventually its nature was recognised, and with increased care, but few fresh cases occurred.

Rinderpest of a very severe type occurred at Kohat in May and June 1880, but was fortunately by prompt treatment stamped out, with comparatively small loss,

from a herd of over 2,000 head. The spread of the disease was also prevented; and although a few cases occurred at Thal on one or two occasions, the column was not further troubled with it.

Other Diseases.—There were none of sufficient interest, to enter on here. The animals in the winter suffered from the cold, and later on in May were lost from tympanitis and dysentery, from being fed on over-ripe green barley, more especially weak animals recently arrived from the base. In the beginning these animals were very inadequately fed, as will be seen by my reports, often but a little dry grass or rice-straw being given to them. I strongly urged from time to time the necessity of reform in this matter, and the fairly liberal allowance of grain and *bhusa* ultimately given resulted in a diminished death-rate and much improved meat, both as to quantity and quality.

Sheep suffered from *scab* at Kohat in January 1880, and a large flock had to be isolated in a village some distance from the cantonment. The disease had attained a strong hold before my attention was called to it, and a number were lost from debility caused by the constant irritation the animals were kept in. Eventually the disease was eradicated by treatment. A few other cases occurred at different points of the line, but the disease was kept under control.

Pneumonia.—Deaths from this disease were somewhat numerous in the upper Kuram Valley in the very cold weather.

Small-pox.—An outbreak of this affection occurred at Kuram in June. No Veterinary Surgeon being available to make daily inspection of these animals, I fear the loss was somewhat heavy (about 150), but by segregation of the effected flock the disease was prevented from spreading, and eventually died out.

Elephants.—I had some few opportunities of treating these animals: and as but little is known of them, while very much more might be known with advantage to Government, I think it well to place on record what I was able to glean.

Foot and mouth disease known in the vernacular as *bhow*. I saw one or two well-marked instances of this disease, a very severe one as affecting this class of animal. The symptoms, as in other

classes, consist of an eruption of vesicles at the junction of the cutaneous and horny structures of the foot, attended with great lameness, and unfortunately not unfrequently from what I could gather from enquiries, with sloughing off of the whole horny pad of the foot, leaving the unfortunate animal standing on the sensitive structures. The native attendants assured me that these structures would be reproduced in a few months; but in one case which I saw, in which all four feet were so denuded of their covering, the animal died from irritative fever. The vesicles in the mouth are very marked, being as large as a rupee, and the flow of saliva is considerable. The treatment to be adopted would be of course cleanliness to the sore, etc., but the main thing to be borne in mind by those in charge of these valuable animals is the infectious nature of the disease. The cases I saw were standing in the ordinary lines beside other elephants, and it was with no little difficulty that I could induce belief in the contagious nature of the malady.

Sore backs.—These are not uncommon owing to want of attention to the "pads," bad loading, etc., and are of a very obstinate description. From the immense thickness of the skin, separation of dead portions of it is a very slow process, and pus finding exit difficult from the same cause, burrows and forms bad sinuses. When separation of a portion of dead skin is seen to be taking place, marked by a white ring of softened tissue and often small pustular like elevations, it should be boldly cut out, otherwise it may take many months to separate. Large masses of dead areolar tissue will usually be found underneath, which will gradually slough away, and an immense quantity of thick curd-like pus which seems to be formed as fast as removed. Persistent washing with warm water and to do this effectually a Read's enema syringe is required to pump water into the wound with considerable force, is necessary; and daily turpentine and oil dressings will speedily produce a plentiful crop of bright red granulations, and the wound will fill up and cicatrise.

Serous or other abscesses on the back, etc., can be discovered by the touch and should be boldly cut into and freely pumped out

daily with warm water, care being taken not to allow the wound to close till the interior is perfectly healthy, by keeping a pad of tow, soaked in carbolized oil, constantly in the opening, and by increasing the opening again by the aid of the knife in the event of its appearing to be closing too rapidly.

Capped Elbow from bruising of the joint in lying down on the stones is very common, and sometimes when it suppurates and bursts of itself, forms a troublesome wound. On the first appearance fomentation should be had recourse to, and arrangements made to protect the elbow with a pad when the elephant lies down. If pus appears to be forming, it is better to open than let it burst of itself; or if that event takes place, the ragged wound should be kept clean, syringed with warm water daily, and dressed with carbolic oil or turpentine liniment,—tow being saturated with the dressing and thrust into the wound.

Tympanitis.—I have seen arise from over-indulgence in green food, the belly being enormously distended with gas. This is generally treated by the *mahouts*, by the administration of a large number of spices and other drugs, amongst which assafoetida and garlic take a prominent place; "ghee", too, in large quantities has a favorable effect.

Edema Of the extremities is common, especially in debilitated animals. The best remedy for this is probably gentle exercise, change of food, etc. The natives also give a purgative consisting of *pilas papera* (the seed of the *butea frondosa* or *dhak tree*), combined with *indur jav* (the wild oat), salt, muriate of ammonia, and *Kala jeera* (black cumamin seed). They also use a drug known as *Kootki*, which has a diuretic effect. *Elephants produce free purgation* in themselves by eating earth. They will scoop up considerable quantities with their trunks, and swallow it, the result being always satisfactory. Medicines given have to be disguised in food, the *chappaties*, or unleavened wheaten cakes, on which they are fed, and of course some difficulty arises in the matter if the animal refuse to eat it. Very sensitive to pain, the slightest prick on their thick skins producing a sharp cry; and terribly afraid of the knife, they still submit in the majority of instances to be operated on if treated properly, except in cases of

"must" males; and when the treatment is of a soothing nature, as fomentation, injection of warm water into sores, etc; lie down, and submit with a ludicrous expression of contentment on their faces; when *must*, however, or bad-tempered, it is nearly impossible to do any thing with them, and I have had occasion to beat a hasty retreat under such circumstances.

I had at Kohat to point out the impropriety of making *standing places* of the animal's own *dung* on which to picket them. An idea exists that the dung is quite innocuous; and it certainly is less offensive than that of any other animal's, apparently simply consisting of vegetable fibre; but this in time decomposes, and when saturated with urine, which is excreted in enormous quantities, becomes very offensive, and is liable to produce in all probability attacks of anthrax, which I have no reason to doubt attacks this class of animal as well as any other. I detected also tampering on the part of the supply agent with the quality of flour supplied to them, *atta* or simply ground wheat not being supplied, but what is known by the name of *Phukin*, or in other words fine bran. The native driver, or *mahout*, appears to reign pretty nearly supreme in the management of these useful and valuable animals, and I think it a pity that means are not taken by Europeans to attain more knowledge of their habits, diseases, etc.

Varieties of transport animals, and their adaptability for the purpose. The Camel has proved most unsatisfactory as a beast of burden, at least in Government hands, in the past campaign, and there are many reasons to account for this, which I will try and point out; but it will be necessary for me to go somewhat fully into the subject, even at the risk of being considered prolix. The Camels observed by me during my tour were of three varieties, very distinct,—1st, the animals in the hands of Kabul traders, coming over the "Shutargardan" and other passes from the more northern parts of Afghanistan. These were small animals as to the height, but enormously developed as to bulk, wide chest, strong loins and quarters, large knees and hocks and short thick legs. The hair was long and almost black in colour. They

were largely in the hands of "Ghilzais" coming down to India in the beginning of the cold weather with merchandise, cloth, fruit, etc., and were also in possession, in considerable numbers of "Koochees," or nomads, who wandered about from place to place with flocks of sheep and herds of cattle, according to the capabilities of the country for grazing, living in black camel-hair tents, always working their way down southward in the beginning of the winter, and back again to the higher levels northward in the early summer. These camels, whether carrying the goods of the merchant, the camp equipage and family of the Koochees, as often as not, in the spring, their own young ones, only a few days or weeks old, on their backs or wending their way up the steep ascents of the Peiwar Kotal or of the Spingai Pass, laden with huge blocks of rock salt, were perfectly free from nose ropes or other gear of that kind, and were driven along like a flock of sheep. Always in good condition, living on herbage alone, with fine soft coats and pliable skins, these animals might be handled with impunity as far as freedom from the unpleasant smell so well known in camels was concerned, except in the case of the "must" male. As early as March, I met these animals proceeding northward, and my last recollection of them in the Kuram Valley until the end of summer was in the month of April close to the Peiwar Kotal. Dr. Aitchison informed me that on ascending "Siktha Ram," the highest point of the "Safed Koh," he saw these animals as high as 12,000 feet on the summer grazing grounds in perfect condition. Very early in my tour of duty I recommended the employment of these camels by Government, but whether they were obtainable by purchase or hire I know not. They however did good service, especially in the end of the campaign, in carrying stores to the base as local carriage, that is carriage paid for by weight or "maundage." Under the same system of management as those of the class Government possessed, I fear they would have met with a similar fate.

Next in importance, or rather perhaps of more importance, as far as the Kuram force carriage was concerned, came the *Jowaki*

camel, the property of the Afridi of that tribe. These were altogether big Camels of great stature combined with bulk, light in colour, from brown to fawn lint, and occasionally almost white. In this class the nose rope was used passing to the tail of the preceding camel. Long strings of them might be seen daily in Kohat and Thal bringing up commissariat stores, the young ones being loaded with about two maunds, or perhaps only carrying saddles, the most powerful carrying even twelve maunds. The system of feeding and management of these animals was identical with that of the before-mentioned variety, with the exception perhaps of an occasional feed of *bhusa* at night, and that rarely, for green boughs were broken off and brought in for them. Browsing was the only means of aliment afforded them. The system of working these animals by their owners was making a long march of 20 or even 30 miles, and then giving the animals a fair day's browsing and rest to recover their strength and fully fill their bellies, making use of the cool time of the day and even night for marching. Unless arriving late in the evening, they would never remain in a place where there was no grazing grounds, but as at Thal would deposit their loads and proceed without loss of time to more favorable regions. As with the northern Camel, these animals were taken out of work in the early part of the summer, and transferred to their feeding grounds in the higher and cooler regions of the Afridi hills. From the end of March to the latter part of September, the Camel might have been an unknown animal in the region of Kohat, as far as any traces of it appeared to the observer. Tempted by the profit to be obtained, a few of these men worked their Camels in the Government service till the middle of May; and the empty saddles carried back told their own tale of losses incurred, while any allusion to them was often answered by the owners in anything but a satisfied tone. Although their natural green food forms as a rule their only diet, still I understand that when requiring extra hard work from the animals, grain is often given, especially by the "Ghilzais," and in no sparing manner; and the many high conditioned, healthy, grain fed "Jowari" or riding camels, I have seen speaks to the fact that where hard work

is required, as in the case of other animals, it can be used to advantage.

Camels, the property of Government, or hired for a certain rate per head per mensem, were all Punjab or Sind bred, many of them fine animals; but a large majority were young, weedy, and delicate, quite unfitted for work on active service. From my first entrance on my duties with the force, I examined as to age; and reported from time to time on the subject; but in para 32, I gave the result of the inspection of nearly 1,900 camels, of which 1658 were examined as to age; and taking these as a fair sample of the whole number, 35 per cent. were either old, had only two permanent teeth or none at all, that is the young ones varied in age from say 18 months to 5 years. The latter seems a sufficiently advanced age for an animal to work; but when it is compared with the 2½ year old horse, with which it exactly corresponds, this point becomes more than doubtful; and an inspection of the physical development of a number of these animals is quite sufficient to set the question at rest. The aged ones were of course equally unfitted for work. From many observations and enquiries, I was enabled to arrive at a satisfactory conclusion as to the periods at which these animals cut their teeth,—*vide* my office letter No 196, dated 12th April 1880, printed by order of the Government of India for information, I fixed the youngest serviceable age at four-teeth or six years, but I believe the custom prevails in the frontier regiments of taking none under six teeth, or seven years of age, and I doubt not with great advantage to the serviceability of their transport. These animals were fed almost entirely on dry fodder and grain, getting but little natural browsing and small supply of green food, except in the month of May, when green barley, etc., crops were available, and later on, when a small quantity of green Indian corn was obtainable. They were worked late into the hot weather, and more or less all through it, and were unavoidably kept in a state almost totally opposite to that in which native camels are kept, besides being retained in a climate, during the most unhealthy seasons quite unfitted to them. No camels appear to be kept by the people of the Kuram Valley, and they say that

the animal cannot live there in the summer season. In the winter they suffered equally in the upper part of the valley from cold and exposure, added to indifferent management in feeding. The result in heavy losses is evident. On the whole, the camel has proved a most indifferent transport animal in Government hands, and I strongly advise, if occasion should arise in the future, that only "local" carriage should be used, the animals remaining in the hands of their own owners and carriage paid for by weight. The Government drivers took little or no interest in their charge, and owners of the hired class, disliking the service, unable to manage their animals as they wished, with prospect of lying idly by, while they were disabled, and getting compensation for them when dead, took equally small interest albeit in their own property.

Mules,—These animals prove as valuable a means of transport as the camels did the reverse. In the first hurried advance in September 1879, they, with all other classes, suffered much from mange, saddle galls, and other sores, and from debility, the result of want of proper feeding, owing to deficient supervision and indifferent organization. The hired class, left to the tender mercy of their owners, suffered either from cupidity or inability to supply them with food ; while the Government animals were equally or in a greater degree, neglected by their attendants, who undoubtedly stole the grain from ignorance and wilfulness combined, rendered these animals useless from sore-backs, and took not the slightest care to retain them in working condition or restore them when sick,—preferring infinitely to remain in idleness at one of the depots than work on the line of march. With improved transport organization and increased European superintendence, this state of things speedily disappeared, and in a few months the mule train was in as satisfactory a state as could be fairly expected. More care was required in their selection, as pointed out by me from time to time, many young animals being both hired and purchased. I have written so frequently on this subject that I will not enter more fully on it here. A glance at para 32 will show that out of nearly 2,000 mules and ponies combined,

nearly 13 per cent. must have been under four years of age when hired or purchased six months previously, and a further per centage of 18 of old animals. It must be borne in mind, too, that this calculation was made after a large number of young animals had broken down and died. Of yearlings and two year olds, of which there were not a few, nothing need be said; it must be evident that they are unfitted for work, but three years' olds are also useless for transport purposes, being incapable of great physical exertion, or of withstanding exposure to hardships such as they must undergo on active service. The digestive powers of the mule are marvellous,—whole dry barley or Indian-corn being thoroughly assimilated, but few grains passing undigested with the fæces, while nothing in the shape of fodder comes amiss, be it *bhusa*, dry grass, highly redolent of turpentine, or coarse rice-straw. On a modicum of green fodder he waxes fat, and resents the imposition of a load. Owing to his straight back and absence of “wither,” or prominent spine when in good condition, it is easy to fit a pack saddle, and his tough feet require no shoes in the stoniest country. As a weight carrier, he is unsurpassed in comparison to his size by any animal, even the camel or elephant. The load for a government mule was supposed to be two maunds, but it was no usual sight to see strings of “local” mules, many the property of “Tajis” or inhabitants of the Hariab Valley, or “Turis” of the Kuram, animals of from 13 to 13½ hands high, carrying four, or even five, maunds of grain or flour, or say from 23 to 29 stone weight. The latter was the weight fixed by Government for the camel, and as an average all round was not carried.

I would urge strongly the necessity of attention being paid to mule-breeding. Whatever necessity may arise for the transport on the Afghan frontier or any other hilly districts of India, the mule must be the animal chosen for it in the future. The camel in two campaigns, removed from its natural mode of life and management, which must be more or less the case in a Government transport train, has proved an utter failure, while the other animal was proved the backbone of the supply arrangements. Already extensively used on the frontier and in the Punjab, it will become still more so if breeding is encouraged, and a large

supply will be available at moderate prices when required. During the past campaign the price of mules rose enormously, 150 to 250 rupees being asked for very moderate animals, and for fine mules very much larger prices were realized. For ordinary transport work, a stout built animal of from 13 to 13½ hands high is sufficiently big. Higher than that they become difficult to load, and increased height is often only attained by increased length of leg, but not of strength.

Ponies.—These animals were on the whole not satisfactory. A number of small ones, under 13 hands high, were sent up from the Bombay presidency, arriving in the Kuram Valley in December 1879, and proceeding direct to join the "Zaimukht" operations under the late Brigadier-General Tytler. They did excellent service there, and in ordinary transport work afterwards. Small, compact, round barrelled animals, they kept their condition, were quick walkers, and worked cheerfully and well under a load of two mannds.

A batch of ponies received from Dera Ismail Khan and afterwards attached to the 29th Punjab Native Infantry were just the opposite of these. Leggy beasts of 13 hands 3 inches to 14 hands 1 inch, more fitted for draught than pack, with sharp spines and high withers; they were constantly subject to sore-backs, and never in good condition. Every description of pony was sent up,—from the diminutive grass-cutter's *tattu*, flat-sided, narrow chested, rubbing his hocks together, and crossing his fore-legs at every step, to the big, ragged, sharp spined, high withered Yaboo and 14-hand country bred *ekka* pony, and of every age, from 1 year to 20. It was not expected that such a miscellaneous collection of animals could prove entirely satisfactory; but although the really well-shaped ones did their work well, they were not equal to mules even of the same size. They had not the same digestive powers, and require much more attention to the preparation and in the selection of fodder, while their different shaped backs demand greater care in the fitting of pack saddles.

Donkeys.—Of these, principally hired, the majority were discharged as being too small and weak for the service; they suffer-

ed extensively from mange, sore-backs, etc., and a very large percentage died in the early winter months. They were, I fear, much neglected by their owners, were in low condition before reaching the base of operations; and were victims to the mistaken policy of trying to use mouldy flour as animal food, and want of proper supply of fodder at road posts in the early months. Their age, too, was much against them, 30 per cent being under four years of age and 13 per cent very old at the time of selection. A number of very fine donkeys are obtainable along the frontier, however, many of those I saw being quite fitted for use as stallions for mule breeding, being little inferior to those now imported by Government from Egypt and Arabia. The better class, kept on in the transport, and under improved management, regained their condition and did good work, though inferior to the mule; and large quantities of commissariat stores in compact form, such as bags of flour and grain, were carried up by "local" carriers of donkeys even of small size.

Bullocks.—The last and most inferior description of transport animals used. A very large proportion of these animals were physically unfit, and were not of the proper stamp of pack bullocks, the yoke mark on the neck proving that they had been taken from the plough or cart. A very large number sent up to Thal never got beyond that place, but were sold off at a great loss, and those that were kept through the whole period did not do work in proportion to the cost of their keep. Subject to such diseases as rinderpest, foot and mouth diseases, anthrax, etc., which may break out at any time and destroy large numbers, or render them unfit for service, they are very unsafe carriage for an army to trust to. They are extremely slow, and in a mixed convoy of mules, camels, etc., which it is necessary in an enemy's country to keep closed up under the eye of the guard, they render the constant halting of the faster animals requisite, and wear them out by keeping them standing under their loads and increasing the time taken on the journey. Their feet are not fitted for stony hill roads, and men who can shoe them are not so easily found, or at any rate were not present with the Kuram force. They suffered terribly from sore-backs, but this might in a great measure

have been prevented by the use of better pack gear. Simple folded jhools and pads being used, and the loads slung by ropes, the pressure came direct on the spine, and caused serious injury and when *soonkhas* were used to protect the spine, they were as a rule too thin or too badly cared for, as to stuffing, etc., to be of any practical use. The digestive powers of these animals, too, are very weak, barley, Indian-corn, etc., being passed through the bowels almost entirely undigested, unless well ground. Exposure to cold and wet or neglect of proper clothing kills them speedily. With good roads, in carts, properly clothed and fed, or in the hands of their own owners in the plains of India as pack animals, they may be valuable transport; or in Afghanistan in the hands of local carriers, requiring no guards or superintendence they may do good service, but under any other circumstances they are of doubtful utility to government.

Carts Pony.—A number of these of a very light pattern were sent from Fatehgarh for use with the Kuram Force but they were not well adapted for the purpose, being insufficiently strong and made on a false principle, more especially as to the mode in which the animal was harnessed. They consisted, first, of a pair of light wooden wheels, with slight iron tires and two very short iron axles secured by a linch pin in the wheel and inserted into a wooden cross-bar passing under the cart and forming its bed or foundation. These short axles were a mistake, as they constantly broke or bent, and ought to have been continuous as one piece, the whole breadth of the cart. The side pieces, consisting of two lower long bamboos, forming in front the shafts, were raised from the wooden cross bar or bed on either side by two short bamboos crossed X wise, the two lower points being lashed to the bed, and the two upper to the side bamboos. This was another very weak point, as these bamboos soon collapsed, letting the cart down on one side or the other, or on both; and their place might have been advantageously supplied by wooden blocks; with the side bamboos securely fastened to them by iron braces. Between these poles, as far as they formed the body of the cart, was suspended a net to contain baggage, fodder, etc., and on them

was laid another lighter frame of bamboo, the front and back bars extending over the side ones to prevent its sinking and having a canvas bottom. This was, I presume, intended to use as a stretcher for the conveyance of sick or wounded men, and could be lifted off and replaced at pleasure. The harness of the pony consisted of a pad and "Soonkha" retained by a web surcingle, secured on the near side immediately behind the elbow of the animal by an iron D and leather tie, and this D, from its position, naturally galled the elbow severely. The shafts were slung in a pair of web "tugs," and instead of the back band being "rove" through the pad, it was simply thrown over it, and was thus at liberty to slip backward or forward as the cart was pulled up or down hill. The draught was from rope traces and a leather breast-band, the latter being extremely short, extending barely from the point of one shoulder to that of the other, was lined with raw sheep skin which, having dried and cracked, cut the animal's chest, while the band being terminated, at each end by an iron ring, to which the rope trace was attached by a rough knot having no leather shield of any sort under it, was a further cause of wounds. The mode of fastening the component parts of the cart together by lashing was perhaps a good idea, as tending to facilitate speedy repairs on service; but the material, employed *moonge*, or grass string, was very inferior for the purpose and raw hide, put on wet, would have been much better. Except that they were sufficiently lengthy for a man to lie down in them, they were far inferior to the Punjab *ekka* in regard to carrying purposes, strength and mode of draught,—the latter peculiar to the *ekka*, being particularly well adapted to rough roads and long distances.

Pack saddles.—There ought to be no more difficulty in fitting a pack saddle to an animal's back than an ordinary hunting or any other description of saddle, yet the inability to do this was the main cause of inefficiency in animals. There are but two or three things to be considered, the principal of which are the imposition of weight on the part of the back alone fitted to bear it, and the protection of the spine from pressure, with sufficient strength in the saddle to stand wear and tear, and the attachment of rings or

hooks for the suspension of the load.

The simplest form of pack saddle and the one in commonest use in India is what is known on the frontier as the "Soonkha." This is a long roll of grass, generally of a peculiar, flexible, tough description, enclosed in sacking, bent on itself in the shape of the letter U. A pad, or folded blanket, being placed on the back, the "Soonkha" is placed over it, the rounded lud being forward over the wither or in front of it, the posterior end projecting backward; the arms occupying either side of the spine,—united at intervals by stays of cord or leather,—and projecting above it, protect it from pressure of the rope when the animals is loaded. Crude as this arrangement is, it nevertheless forms the pack-gear universally used through India and Afghanistan as far as my experience goes, and as in a campaign large supplies of elaborate pack saddles are not always available, it is well worthy of consideration.

As to the "Soonkha" itself, the peculiar description of grass requisite for stuffing it is not invariably obtainable, and ordinary grass soon breaks. Made of old blanket, sacking, or any like description of material, it is more lasting, and adapts itself better to the animal's back. The saddle of this description in use with the force was one known as the "Ambeyla" pad, a drawing of which, kindly done for me by Lieutenant Leach, R. E., I attach.* This, as well be seen, consists of a pair of leather stuffed side pads or "pannels" united at the spine by several cross straps of leather, supplied with a double girth, crupper, breeching and breast straps. Under this is placed the "Soonkha" over a folded *Jhool*, blanket, or pad. The drawback to this otherwise simple and cheap pack is that the curve of the Soonkha galls the wither badly, and this is in great measure caused by the pad extending too far forward, and binding the soonkha firmly down on that part, the girth straining the front cross-strap tight.

With a *soonkha* made of *old blankets*, etc., rolled by and covered externally with sacking, secured in its place, over folded horse-rugs, by a web surcingle occupying the usual situation, I worked

* We regret that we are unable to reproduce these drawings.—Eds.

a very high-withered, sharp-spined pony of my own carrying a pair of large mule trunks weighing fully three maunds over the whole extent of the line on several occasions without in the least hurting the back,—the secret being simply that the soonkha was thick, flexible, and being secured only in one place by the roller, “sprung” a little off the withers where the load was imposed on it.

Another form of this pack gear which is used in some parts of Afghanistan, I believe, and very commonly by grass-cutters, consists of two separate rolls, one for either side, not united in front, thus doing away with the pressure on the wither altogether. If these are made thick enough about the size round of an ordinary cavalry valise when packed full, united over the back by several broad bands of leather (which should be run through the whole substance of the roll and secured from pulling through by a piece of wood at each end), and secured in position by an ordinary broad web “roller” fastened on the near side, well up and free of the elbow by an iron D and leather tie, they will answer every practical purpose. There was sent from *Bombay* presidency a rough kind of pack, which was extremely cheap, but not very serviceable. It consisted simply of a stuffed sacking pad, filled fuller on either side of the spine to raise it and prevent pressure, and fitted over the arches of the ribs with a bamboo on either side for the purpose of slinging the load. The stuffing speedily collapsed, and the pack became little more than a sack thrown over the back. They required constant re-stuffing or the addition of soonkhas. Equally rough was the *Bannu Saddle*, which however possessed a tree consisting of two rough side bars resting on the arches of the ribs, and united over the spine by two iron arches, fitted with hooks for loading purposes, and with a bamboo extended on each side from one to the other, giving attachment to the girth. To this was added a rough sacking pad.

The *Jhelum Saddle* had a “tree” similar to the above, but the arches were wooden, strengthened with iron, and were united to each other by several longitudinal iron rods, over which the loading ropes were thrown instead of being fastened to hook or sticks, as in the other saddles; and the result was that the ropes having a distance of about a foot of polished iron rod to travel backward

and forward over, allowed the load to slip back in going up-hill and forward in going down. The pad of this saddle was of leather, and the girth springing from rings low down on the pad, not giving as firm a purchase as in those originating higher up.

Of the *ordnance saddle*, which is similar to the Otago saddle used in New Zealand and Abyssinia, and other modifications of it, in all essential particulars, I enclose a sketch which will explain its construction. It is a good saddle when properly fitted and kept in good order, but is very heavy and expensive, and was in most cases far too large for the animals for which it was required. This point requires to be fully borne in mind in supplying saddles for a transport train.

The *main fault* to be found in all pack saddle trees is that the side "bars" resting on the ribs are little more than straight, broad, flat bars of wood, but little curved to fit the portion of the frame to which they are intended to be applied, and no stuffing will effectually remedy this. Moreover, they are extended too far back, under a mistaken notion of diffusing the weight, throwing the burden on to the loins and the flexible posterior ribs both of which being mobile parts, are unfitted to bear it, and require especially to be free, the one for facile locomotion, the other respiration, in ascending and descending steep, rough hills.

The trees are far too wide, more adapted to fit a London Dray horse than a 13-hand mule or pony, or any ordinary horse, necessitating the introduction of a large amount of stuffing, which, put in very loosely by native agency, speedily subsides, leaving the serge or other material of the pad or pannel loose in wrinkles and folds. Generally, however, the width of the tree rendered necessary the folding up of the animal's clothing to put under the saddle, and then the surface next the skin consisted of rough country sacking, hard and stiff with perspiration, ragged or coarsely patched, and not too carefully folded. Open an ordinary hunting saddle, and the tree will be found, in its uncovered state to fit, more or less accurately, the part of the trunk on which it is supposed to bear, requiring but a few inches of stuffing to soften its contact with the skin. Moreover, it extends exactly over that portion which from the solid

attachment and limited degree of flexibility of the ribs is alone adapted to bear the weight. This tree, which will carry a heavy man in the hunting field, the weight placed immediately over the spine and of a shifting character, will surely carry equal load, placed in a more favorable position, on an animal placing slowly along the road. And practically a hunting saddle does make an excellent pack saddle as far as preserving the animal's back goes, requiring but attachments, etc., for fastening on the load.

The *Pathan* riding saddle consists of a well-shaped tree, the side bars curved to fit the back, and covered with raw hide, evidently stitched on wet and allowed to shrink into place, are united by a front and back arch, between which is suspended a leather seat.

Flaps or pannels there are none, the saddle tree being placed on a *numdah*, and secured in its place by a roller or girth passed under the seat and right round the body of the horse. This too forms a very useful pack saddle for many purposes, and I am inclined to think that a modification of it might prove fitting for transport.

Breast-Straps, Breeching, etc.—These articles of gear are in great measure rendered necessary by ill-fitting saddles, which sitting badly on the back, require to be held on from behind when the animal is going down-hill, and *vice versa* when going up. As a rule they were so ill-fitted as to be useless. Hanging loose and dangling about the animal's hocks and knees; occasionally they were pure instruments of torture, tightened up to the extent of cutting into the flesh. Not unfrequently the breast strap from the saddle being perched upon a mass of folded blankets, became almost vertical, instead of horizontal in direction, and being then tightened up to embrace the windpipe, tended to suffocate the mule, especially when the head was depressed in steep, ascents. This portion of gear, as will be seen by the sketch, is well placed in the ordnance saddle, but it will also be evident that when the saddle is too large or small for the animal, this is at once altered.

Connecting ropes.—It was customary to tie three animals to-

gether, that being the number allotted to one man. This was usually done by fastening the head rope to the back of the saddle of the leading mule; but this was an inconvenient plan, as when the rear mule hung back, the saddle was pulled backward. Tied head to head, they would go abreast, which the road would not always admit of. A line carried back from the leading mule's headstall through a ring on the crupper would probably meet the requirement.

Mode of loading.—This required much more attention than was given to it, both as to the manner of putting the load on and the fitness of the articles as to shape, etc., for being loaded on animals of the class. When proper pack saddles and baggage straps were used, and animals loaded with suitable-sized parcels of commissariat stores, under the immediate supervision of transport officers, this was well enough done, the loads being placed high up, well over the arches of the ribs; but where animals were used for private carriage, and even regimental requirements, especially with the ordinary pack gear, it was a very common sight to see loads slung low down forward over the withers, or backward over the loins, incommoding the animal in progression and interfering with respiration, besides tending to the production of galls, etc.

For mule or pony carriage it is necessary that *all stores be made up into suitable-sized packages*, weighing not more than one maund, or less than half a maund. There are few things so bulky as not to form fair-sized parcels at these weights. Most commissariat stores did come within this class, rum, even, being filled into small kegs suitable for this kind of transport. Ammunition and treasure were very portable. Officers' baggage, however, requires considerable regulating; portmanteaus of various shapes and sizes; tin cases, wooden bath tubs; elaborate tables and hanging chairs are not required on service.

The 80lb: Kabul tent has proved sufficient for general requirements; but the rest of the officer's kit requires to be made to correspond. Tent poles should be made jointed, and bedsteads hinged to double up into lengths not exceeding $3\frac{1}{2}$ feet. The so called *Yak Dan* of the frontier, a box made of extremely light pine wood,

covered with leather and fitted with straps and buckles to sling on a mule or other animal, should take the place of all other articles of the kind; baths can be had, made of Indian rubber or canvas, and a light pine wood camp table 12×18 inches, and small folding camp stool to match, ought to answer all requirements. It is a pitiable sight to see, as I have often done, a mule or pony struggling along with two boxes of wood or tin, or portmanteau (probably slung low down by ropes, interfering with the motion of the limbs,) sundry small cases or packages piled on these with very little thought as to preservation of equal weight on either side, and an iron or wooden bath tub, perched on the top of the back, and probably containing other small articles; or an animal loaded with tent and bed, the long poles of which extended beyond the head and tail,—alternately hitting him on the poll and other extremity, while a large sized lounging chair added to the inconvenient nature of the load, and an iron bucket, or so, slung on to any convenient place, from which peeped the ends of sundry iron pegs for picketing horses, completed its cumbersome nature. Such loads could but lead to sore-backs, requiring as they did an attempt at re-adjustment, by heaving them up from one side or the other, as they slipped every few hundred yards.

Instruction to attendants and superintendents in loading was much required, and I need offer no apology for entering thus fully into the matter, as it was the cause of a very vast amount of unnecessary inefficiency.

Picketting.—The modes of picketting in use with the various branches of the service were as follows :—C. Battery, 4th Brigade, Royal Artillery.—An ordinary long picket rope, level with ground, pegged down at intervals, to which head ropes were attached, a fairly secure and convenient style of picketing when a number of animals always moved together, and carriage for the rope, etc., was available. Heel ropes were used in addition, secured to pegs.

No. 1 Battery, 8th Brigade, Royal Artillery (mountain) single iron pegs, with head and heel ropes. Easily drawn.

Bengal Cavalry—Double head ropes and iron-pegs used, in

addition to heel ropes. A secure mode of fastening, and convenient for detached sowars and parties. Gear carried on grass-cutters' ponies. Transport.—In most cases the three animals in charge of one man were secured to one iron peg, and heel ropes secured in the same way. The plan had the drawback of crowding the mules, etc., very closely together, but when space was an object, which was generally the case, this could not be avoided.

Picketing pegs were mostly made of iron, the rocky soil not admitting of wooden pegs being driven, and these had to be strong and heavy. A better description of peg is made of angle iron solid at the point only. This offers much greater resistance to the animal pulling back owing to the increased surface presented to the ground.

Forge carts.—The forge in use with the field artillery consisted of a frame with folding legs, carrying furnace and bellows. It answered the purpose well, but when packed for travelling, took a wagon and four or six horses for its conveyance.

No. 1 Battery, 8th Brigade, had a small forge for mule carriage, with a revolving fan instead of bellows. It answered its purpose when supplied with bellows, but the fan was a failure, quickly getting out of repair.

Shoes, etc.—Shoes of moderate weight stood the wear and tear of the rough ground best. Slight shoes bent, and very heavy ones were more likely to be torn off. The Bengal Cavalry shoes, which were of course much lighter than those used by Artillery, stood wear of patrol duty fairly well. I certainly frequently found them broken or bent into the foot, but it was in most cases from being kept on till worn very thin; and lameness from any cause connected with shoeing was rare.

Five to six good tough nails per shoe were required; the "clinchers" were turned down in the ordinary way in the Artillery but in the Bengal Cavalry the point of the nail was frequently twisted into a coil, and this answered well, though clumsy looking.

Line Gear.—The ropes, head, heel and picketing, in possession of the three batteries of Artillery, issued by the com-

missariat, were of very inferior description or quality, and the same remark applies to the blaukets, those supplied primarily to No. 1 Mountain Battery, 8th Brigade, being especially bad. Brushes too, were very bad, being made, not of pigs' bristles, as they ought to be, but of horse and cow hair, stiffened with gum or size, to represent the real article. They speedily became soft and quite useless.

Horses best suited for the service.—I have but little faith in the adaptability of one breed of horses to hardships better than another. Physical fitness for the service is the point to be looked to. If the horse is of good shape, sound constitution, fairly bred, and adapted as to size and weight to the branch in which he is placed, it matters little whether he be "Waler," country-bred, or Arab.

The horses of C. Battery, 4th Brigade, and E. Battery, 3rd Brigade, Royal Artillery, were Australians and stud-breds, with a few Persians. In neither of these batteries were they called upon to perform any very hard work, or exposed to any particular hardships or severity of climate; and were in both cases well cared for and tended. Fodder was of course scarce and inferior at certain seasons, and animals in consequence fell off somewhat, in condition; but speedily regained it when fodder improved. The mules of No. 1 Battery, 8th Brigade, were always in excellent condition on any fodder; but the ponies originally supplied as part of the equipment were a total failure, and had to be cast. As ponies for the purpose, they were a poor selection as to shape, etc., but I doubt whether this class of animal is at all adapted for use in mountain batteries. Three year old mules are also a mistake, and looking to the difficulty of procuring these animals of a suitable age, I think a suggestion made by me in a previous report is worthy of consideration, *i.e.*, that young mules should be purchased at the Punjab fairs and sent to the remount depôt till four years of age. The horses of the three regiments of Bengal Cavalry, the 1st, 13th, and 15th, were all country-bred, and adapted to their work. Those of the first and last-named suffered considerably from the scarcity of fodder, and residence on the road from Thal to Balesh Khel; the 13th were

more favourably placed in the summer months, but had a greater degree of cold, &c., to bear in the winter at Kuram. All these regiments emerged from the campaign with their horses in good condition, but the 1st and 18th had suffered heavily from sickness, and the 13th lost a number of horses by a fire in their lines.

Horse Biscuits.—A number of these were in possession of the Commissariat, for trial I presume, but my attention was not called to them till very late. I found, however, that all classes of animals,—camels, bullocks, ponies and mules,—ate them readily after a time when broken up, and I have no doubt they are wholesome food ; but as they are not in the least degree more portable than grain, and bulk for bulk probably not more nutritious, I see but little advantage in them.

Khika grass.—This grass, said to be poisonous, grows profusely on the hills in the Kuram Valley ; it has a coarse, long, rough, bright green blade, and is not of a very edible description. I was unfortunately unable to carry out any experiments with it myself, being obliged to go down to Kohat when about to do so ; but Mr. Slattery fed two camels on a considerable quantity of it, and also a pony for a number of days, with no result whatever. As it must be commonly cut and used with other hill grasses, I think its poisonous nature is open to doubt. No cases occurred of apparent narcotic poisoning, which is the form it is said to produce ; and on the Peiwar Kotal, where it grows plentifully, it must have been consumed with other sorts by the large number of animals there in the summer-months. Dr. Aitchison informs that the cases mentioned in the Veterinary Journal for February 1880, as having occurred at Thal, were not supposed by him to be cases of poisoning from this grass at all, the symptoms, principally those attending tympanitis, not being those attending cases of poisoning from the *Khika* grass, which, also, as far as I could gather, does not grow in that neighbourhood.

Veterinary aid for the force was limited, there being but three officers to attend to the requirements of three batteries of Artillery, three regiments of Native Cavalry, and a large transport train and commissariat establishment spread over an extended line of country ; and on active service it is as absolutely necessary that

the ration sheep should be looked after, as the valuable artillery horse; and that the Native troops should receive as much attention as the European. An outbreak of disease in any class of animals is likely to prove of serious import to the force at large. A limited number of Veterinary officers will of course suffice for superintendence, if backed up by a good subordinate staff, and the want of well-trained men in this position was most severely felt; the so-called *Salutries* in the transport and commissariat having no claim to that title whatever, although highly paid for the work. A training school for men of this class is very urgently needed, in which they might be thoroughly grounded in the work required of them; and from considerable experience I can vouch for the intelligence of the natives in acquiring knowledge, and the facility with which they can be made into valuable Veterinary assistants. The men in Cavalry regiments were but little better than those in other departments, treating disease by means of certain recipes, in ignorance of the true nature of the maladies or the action of the drugs used. In one instance I was fortunate enough to be able to render assistance in the case of a valuable English charger suffering from stoppage of the bowels, when the *Salutrie* in charge was patiently awaiting the result of the administration of a bolus containing camphor and nitre; another case occurred where a valuable imported animal was lost from utter want of knowledge on the part of one of these men. Surgical knowledge they have none, unless application of the actual cautery over an abscess or bad sore-back, rendering the skin hard and thick, and interfering with the curative process may be termed such. Abscesses are allowed to burst, or pus to burrow and form sinuses, or portions of dead bone to act as irritants and keep an open sore for months, without the faintest attempt being made to remedy the evil by use of the knife; while in other cases brutal remedies are had recourse to. A fine mule came under my observation in the course of inspection, dying from acute disease, on the body of which a long line had been drawn with the firing iron, completely encircling the trunk lengthways,—from the chest along one side round the hind quarters, and forward again on the opposite side.

This treatment was supposed to have met with the greatest success, as the animal "got up," and it was gravely proposed to me to repeat it. In the transport lines the most ordinary operation of exploring wounds, etc., had to be done by the Veterinary Surgeon himself, or, as was of necessity the case, where six or seven hundred, or even double that number of animals, were under treatment at one time, in a great measure left undone. Well-trained *Salutries* are absolutely necessary in the transport on a campaign, as are also "Saddlers" and unfortunately in the past operations they were conspicuous by their absence.

At the end of this valuable report are tables of which the following is given as the summary:—

Abstract of the number of Animals treated in the Transport Hospitals, Kuram Field Force, 1879-80.

Hospitals.	ADMITTED.				DISCHARGED.				DIED.				REMANDED.				Remarks.
	Mules and Ponies.	Donkeys.	Camels.	Bullocks.	Mules and Ponies.	Donkeys.	Camels.	Bullocks.	Mules and Ponies.	Donkeys.	Camels.	Bullocks.	Mules and Ponies.	Donkeys.	Camels.	Bullocks.	
Thal ...	1,562	853	1,480	1,775	978	849	1,189	1,510	42	9	259	74	542	...	13	189	
Kuram ...	1,466	526	1,211	982	1,405	504	602	801	26	22	609	131	35	...	...	...
Shalozan...	448	...	575	14	259	...	184	14	...	...	391	...	189	...	...	...	1
Camps at Zeram & Kuram ...	9	...	788	43	9	...	252	42	...	...	533	1	...	...	...	...
Totals ...	3,435	1,384	4,054	2,764	2,651	1,353	2,218	2,366	68	31	1,825	206	766	...	13	190	
G. Totals..		11,687				8,588					2,130		969				

Percentage of Discharges.

Mules and Ponies.	Donkeys.	Camels.	Bullocks.
76.06	97.76	54.70	85.60

Percentage of Deaths.

Mules and Ponies.	Donkeys.	Camels.	Bullocks.
1.95	2.24	45	7.50

Percentage remaining under Treatment.

Mules and Ponies.	Donkeys.	Camels.	Bullocks.
21.99	—	30	6.90

Finally Mr. Oliphant treats of the service rendered by the exe-

cutive Veterinary Officers of the force then being V. S. (1st class) Anderson, and V. S. Webb, Slattery, and Pringle, the two latter officers suffered from disease due to exposure to the unhealthy climate, and V. S. Slattery "was ultimately invalided to England in a very precarious state." He has since left the service.

"In conclusion I would plead the cause of those officers, with regard to the grant of staff pay, for the extra duty performed with the Transport Department. A glance at the return given will shew the duties performed by them were by no means light, and they were much heavier than can be apparent to any one unacquainted with the difficulties, owing to want of proper subordinate establishment, etc., met with. The allowance of Rs. 75 per mensem was small when compared with that of Rs. 200 granted to Transport Officers; but even this was not always available, as it was only admissible when the charge was in addition to that of troops."

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Kuram field Force.

Author

Oliphant, G.A.

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